



JSC-48538
Starting with E11

International Space Station ISS EVA Systems Checklist

**Mission Operations Directorate
Operations Division**

26 APR 05

**This publication replaces
all previous publications.**
**These procedures are available
electronically on the SODF Homepage
at <http://mod.jsc.nasa.gov/do3>**

National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas




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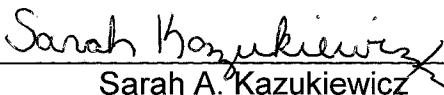
INTERNATIONAL SPACE STATION ISS EVA SYSTEMS CHECKLIST

26 APR 05


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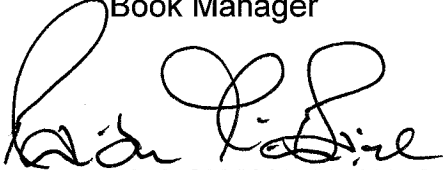
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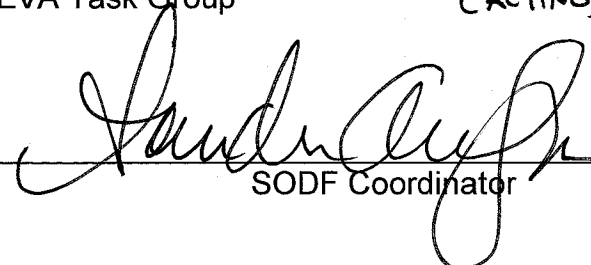
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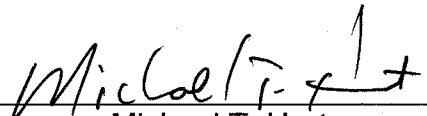


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Michael T. Hurt
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Incorporates the following:			
CR: ISS_EVA_SYSU124	ISS_EVA_SYSU198	ISS_EVA_SYSU242	ISS_EVA_SYSU288
ISS_EVA_SYSU131A	ISS_EVA_SYSU199	ISS_EVA_SYSU243	ISS_EVA_SYSU289A
ISS_EVA_SYSU141	ISS_EVA_SYSU200	ISS_EVA_SYSU244	ISS_EVA_SYSU290
ISS_EVA_SYSU148	ISS_EVA_SYSU201	ISS_EVA_SYSU245	ISS_EVA_SYSU291
ISS_EVA_SYSU154A	ISS_EVA_SYSU202	ISS_EVA_SYSU246	ISS_EVA_SYSU292
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ISS_EVA_SYSU197	ISS_EVA_SYSU241	ISS_EVA_SYSU287	

Uplinked Messages (or Approved Flight Notes) replaced by this revision,
remove from Book:

None

INTERNATIONAL SPACE STATION ISS EVA SYSTEMS CHECKLIST

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	<u>GND</u>	<u>ISS</u>
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10.2 PSIA OPS

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1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5)

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I

OBJECTIVE:

This procedure is typically performed by **MCC-H** to configure the airlock environment for isolated 10.2 psia operations.

NOTE

MCC-H will perform steps 1 to 7 from the ground prior to the crew beginning EVA Prep.

1. CONFIGURING MCA FOR AIRLOCK SAMPLING

PCS

1.1 US Lab: ECLSS: AR Rack: MCA: Nominal Commands

LAB MCA Nominal Commands

√State – Operate

If State not Operate
Go to step 2.

1.2 'Rapid Sampling'

cmd Airlock

√State – Standby, Operate

NOTE

Once the MCA is rapid sampling, it will take approximately 6 minutes to purge the lines. Airlock constituent data is not accurate until this purge is complete.

PCS

1.3 US Lab: ECLSS: AR Rack: MCA

LAB MCA

'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating every 10 seconds

√Sample Location – Airlock

PCS

1.4 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Arm

cmd Execute

1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 2 of 6 pages

2. VERIFYING OXYGEN AND NITROGEN SYSTEM

PCS

2.1 Airlock: ECLSS: Oxygen System

'O2 Hi Pressure Supply Valve'

cmd Open (√Actual Position – Open)

'High Pressure'

√UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia)

2.2 'O2 Low Pressure Supply Valve'

√Actual Position – Open

'Low Pressure'

√PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia)

2.3 Airlock: ECLSS: Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

√PCA N2 Line Press: 689 to 930 kPa (100 to 135 psia)

3. CONFIGURING C&W

PCS

3.1 C&W Summ

'Event Code Tools'

sel Inhibit

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Arm

cmd Execute

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Arm

cmd Execute

3.2 sel Enable

1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 3 of 6 pages

input Event Code – 6 6 0 3 (O2 UIA Supply Pressure Low-A/L)

cmd Execute

input Event Code – 5 0 1 3 (Primary INT MDM Fail-LAB)

cmd Execute

input Event Code – 5 9 1 2 (Cabin SD Fail-A/L)

cmd Execute

input Event Code – 6 5 3 7 (Cabin SD Lens Contamination-A/L)

cmd Execute

input Event Code – 6 5 3 9 (Cabin SD Active BIT Fail-A/L)

cmd Execute

4. CONFIGURING AIRLOCK VENTILATION

PCS

4.1 Airlock: ECLSS: AL1A1 CCAA: CCAA Commands

AL CCAA Commands

'Temperature'

input Temperature Setpoint – 22 deg C

cmd Set

√Command Status – Temp Setpoint Complete

NOTE

Upon IMV Fan deactivation, rpm sensor registers 0 volts. MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm.

4.2 Node 1: ECLSS: IMV Stbd Aft Fan

Node 1 IMV Stbd Aft Fan

'Off'

cmd Arm (√Status – Armed)

cmd Off (√State – Off)

√Speed, rpm: $\sim 7164 \pm 50$

1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 4 of 6 pages

4.3 Node 1: ECLSS: IMV Stbd Aft Valve

Node 1 IMV Stbd Aft Vlv

√State – Enabled

'Close'

cmd Arm (√Status – Armed)

cmd Close

Wait 15 seconds.

√Position – Closed

4.4 Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

√State – Enabled

If Position – Open

'Close'

cmd Arm (√Status – Armed)

cmd Close

Wait 15 seconds.

√Position – Closed

4.5 Airlock: ECLSS: Duct SD

AL Duct Smoke Detector

'Monitoring'

cmd Inhibit

√Status – Inhibited

5. CONFIGURING THE DEPRESS PUMP

PCS

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

√Close Cmd – Ena

cmd RPC Position – Close (Verify – CI)

6. INITIATING ACS CAMPOUT (10.2 psia) MODE

PCS

6.1 Airlock: ECLSS: PCA: Global ACS Commands

Global ACS Commands

'LAB ACS'

1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 5 of 6 pages

√Auto Pressure/Composition Control – Monitor

‘Airlock ACS’

√Auto Pressure/Composition Control – Monitor

‘Campout’

cmd Initiate

NOTE

The Airlock PCA NIV may open when Campout is initiated due to a change in the gas introduction limits. It will close when the Airlock Auto Pressure/Composition Control is inhibited.

6.2 ‘ACS Primary PCA’

√Primary PCA – LAB/Airlock

‘Airlock ACS’

If Auto Pressure/Composition Control – Comp Control

cmd Inhibit (√ – Monitor)

‘LAB ACS’

If Auto Pressure/Composition Control – Comp Control

cmd Inhibit (√ – Monitor)

6.3 Airlock: ECLSS: PCA

AL ACS

√ACS Campout Status – Campout

sel N2 Intro Valve

AL PCA N2 Intro Valve

√Position – Closed

7. INHIBITING AIRLOCK RAPID DEPRESS RESPONSE

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

‘Airlock Depress Response – INT MDM’

cmd Inhibit – Arm (√Status – Armed)

cmd Inhibit

√Airlock Depress Response-INT MDM Status – Inhibited

1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION

(ISS EVA SYS/7A - ALL/FIN 5)

Page 6 of 6 pages

NOTE

MCC-H will perform step 8 from the ground after the airlock has been depressed to 10.2 psia.

8. ENABLING AIRLOCK RAPID DEPRESS RESPONSE AND ALARM

PCS

8.1 Rapid Depress

ISS Depress

'Airlock'

Wait until $|dP/dt| < 0.04$ mmHg/min, then:

8.2 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

cmd Enable

√Airlock Depress Response-INT MDM Status – Enabled

8.3 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Execute

9. CONFIGURING FOR OVERNIGHT CAMPOUT

If required, go to {2.310 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT} (SODF: ISS EVA SYS: OVERNIGHT CAMPOUT) or {2.311 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT - MANUAL PRESSURE CONTROL} (SODF: ISS EVA SYS: OVERNIGHT CAMPOUT) to configure the MCA and Airlock PCA for overnight campout.

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 1 of 6 pages

I

OBJECTIVE:

This procedure is typically performed by **MCC-H** to prepare for airlock repress and to reconfigure the airlock environment after 10.2 psia isolation periods.

NOTE

Step 1 must be performed prior to 10.2 psia airlock repress.

1. INHIBITING ISS RAPID DEPRESS RESPONSE AND ALARM

PCS

1.1 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

'CC MDM Rapid Depress Response'

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

1.2 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

cmd Arm

cmd Execute

1.3 Inhibiting CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

NOTE

Steps 2 to 7 may be performed after the Node 1 Stbd Hatch is open.

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 2 of 6 pages

2. ENABLING ISS RAPID DEPRESS RESPONSE AND ALARM

PCS

2.1 US Lab: ECLSS

Lab: ECLSS

Wait until $|dP/dT| < 0.04$ mmHg/min.

2.2 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

'Enable'

cmd Enable ($\sqrt{\text{Status}}$ – Enabled)

'CC MDM Rapid Depress Response'

'Enable'

cmd Enable ($\sqrt{\text{Status}}$ – Enabled)

2.3 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

cmd Execute

2.4 Enabling CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Enable'

cmd Enable ($\sqrt{\text{Status}}$ – Enabled)

3. CONFIGURING AIRLOCK VENTILATION

PCS

3.1 Airlock: ECLSS: Duct SD

AL Duct Smoke Detector

Verify Obscuration, % Contamination < 25.

Verify Scatter, % Obscuration Per Meter < 1.

'Monitoring'

cmd Enable ($\sqrt{\text{Status}}$ – Enabled)

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 3 of 6 pages

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

3.2 Node 1: ECLSS: IMV Stbd Aft Valve

Node 1 IMV Stbd Aft Vlv

√State – Enabled

'Open'

cmd Arm (√Status – Armed)

cmd Open

√Position – In Transit

Wait 25 seconds.

√Position – Open

3.3 Node 1: ECLSS: IMV Stbd Aft Fan

Node 1 IMV Stbd Aft Fan

'On'

cmd On

√State – In Transit

Wait 15 seconds.

√State – On

√Speed, rpm: 7745 to 9278

4. VERIFYING OXYGEN LEVELS

4.1 US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'MCA'

√State – Operate

If State not Operate

Go to step 5.

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 4 of 6 pages

4.2 sel MCA

LAB MCA

When O2 < 173 mmHg, proceed to step 4.3.

4.3 Lab AR Rack Overview

'MCA'

'Standby Immediate'

cmd Standby Immediate

√State – Standby

5. TERMINATING CAMPOUT SOFTWARE MODE

US Lab: ECLSS: PCA: Global ACS Commands

Global ACS Commands

'Airlock ACS'

'Campout'

cmd Terminate

US Lab: ECLSS: PCA

Lab ACS

√ACS Campout Status – Normal

√Primary PCA – LAB

6. RECONFIGURING MCA

6.1 US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'MCA'

√State – Standby

If State not Standby

Go to step 7.

NOTE

The nominal autosequence list will include Node, Airlock, and Lab modules when MPLM is not available.

PCS

6.2 If desired autosequence list is LAB/Node1/Airlock, LAB/Node1, or LAB/Node1/Airlock/MPLM

'Auto Sequence'

cmd LAB/Node1/Airlock (LAB/Node1) (LAB/Node1/Airlock/MPLM)

~

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 5 of 6 pages

√State – Operate

US Lab: ECLSS: AR Rack: MCA: Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

If another autosequence list is desired, perform {2.301 MCA
AUTO SEQUENCE LIST CHANGE}, all (SODF: ECLSS:
NOMINAL: ARS), then:

PCS

6.3 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Suppress

Suppress Annunciation of an Event

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Arm

cmd Execute

7. CONFIGURING C&W TO NOMINAL CONFIG

7.1 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Execute

7.2 sel Suppress

Suppress Annunciation of an Event

input Event Code – 5 9 1 2 (Cabin SD Fail-A/L)

cmd Arm

cmd Execute

input Event Code – 6 5 3 7 (Cabin SD Lens Contamination-A/L)

1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION

(ISS EVA SYS/7A - ALL/FIN 5) Page 6 of 6 pages

cmd Arm
cmd Execute

input Event Code – 6 5 3 9 (Cabin SD Active BIT Fail-A/L)

cmd Arm
cmd Execute

If performing this procedure after an Overnight Campout

7.3 sel Suppress

Suppress Annunciation of an Event

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

cmd Arm
cmd Execute

NOTE

Step 8 may be performed after the Crewlock Depress is complete.

8. DISABLING THE DEPRESS PUMP

PCS

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

cmd RPC Position – Open (✓ – Op)

EVA PREP/POST

	<u>GND</u>	<u>ISS</u>
1.205 SHUTTLE LEH CONFIGURATION FOR EVA PREBREATHE ON ISS.....	17	17
1.210 EVA PREP USING SHUTTLE O2	19	19
1.215 EVA PREP USING ISS O2.....	33	33
1.220 EMU PURGE.....	47	47
1.225 EMU PREBREATHE	49	49
CREWLOCK DEPRESS/REPRESS CUE CARD	53	53
1.235 EMU STATUS	55	55
1.240 POST EVA	61	61
EVA PREBREATHE CUE CARD	67	67

EVA PREP/POST

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(10 Minutes for PHA Setup)
(5 Minutes for LEH Configuration)

OBJECTIVE:

This procedure will allow the EVA crewmembers to perform their 80-minute mask prebreathe using shuttle O₂. Shuttle LEH O₂ is used for the exercise portion, while shuttle O₂ from the E-Lk PBA ports is used for nonexercise periods. PHA SETUP steps may be performed the night before an EVA. LEH CONFIGURATION steps must be performed immediately prior to EVA PREP.

PHA SETUP

- C-Lk 1. Unstow PHA bags (two 60-ft Bags, one 90-ft Bag).
- E-Lk 2. Verify all three PHA Bags configured per Figure 1, connect all components.



Figure 1.- PHA Bag Configuration.

1.205 SHUTTLE LEH CONFIGURATION FOR EVA PREBREATHE ON ISS

(ISS EVA SYS/UF2 - ALL/FIN 2/PAPER ON ISS) Page 2 of 2 pages

3. Temporarily store both 60-ft PHA bags in E-Lk near A/L PBA port.
4. Transfer 90-ft PHA Bag to orbiter middeck.
Temporarily stow Bag.

LEH CONFIGURATION

5. ✓ **MCC-H** to ensure O2 cryo config will support EVA Prebreathe

L2 6. ✓ O2 XOVR SYS 1,2 – OP

MO32M 7. Relief Valve of 90-ft PHA Bag →|← LEH O2 5

8. LEH O2 5 vlv → OP

9. Route 90-ft PHA from orbiter middeck to CEVIS.
Use Velcro ties to tend hose, as required.

Lab 10. Secure loose end of 90-ft hose to CEVIS using Velcro ties.

1.210 EVA PREP USING SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 5/SPN/HC/PAPER ON ISS)

Page 1 of 13 pages

I

(170 Minutes)

OBJECTIVE:

Prepare for EVA using exercise prebreathe protocol. During exercise, a 90-foot PHA hose is plumbed into a middeck LEH port. Shuttle oxygen is utilized for the entire prebreathe.

1. EVA COMM AND AIRLOCK ENVIRONMENT CONFIG

- MCC-H/IV**
- 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
 - 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then:
 - 1.3 Prior to beginning step 7, perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, steps 1 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:
- IV**
- 1.4 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then:

EXERCISE PREBREATHE/PREP FOR DONNING (110 MINUTES)

2. VERIFYING AIRLOCK EQUIPMENT

- 2.1 √PFE located in PFE locker
√Pressure gauge needle is in green zone (800 to 900 psig)
 - 2.2 √Three PHA Quick Don Masks available to support EVA Prep
 - 2.3 √PBA Bottles and Quick Don Masks located in Airlock for every isolated crewmember
√PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in Airlock
√Oxygen Bottle pressure gauge needle ≥ 3000 psig for each Bottle
 - 2.4 √Two CSA-CPs located in Airlock
√Battery power for both CSA-CPs
- AL10A1**
- 2.5 √Flexible Vent Duct attached to the Conditioned Air Supply connection
 - 2.6 Set up and activate one PCS in Airlock.

√SSC located in Airlock

3. ACTIVATING AIRLOCK CO2 REMOVAL

- 3.1 Unstow new Metox Canisters (two).
Report barcodes to **MCC-H**.

1.210 EVA PREP USING SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 5/SPN/HC/PAPER ON ISS)

Page 2 of 13 pages

- 3.2 Remove Metox Canister caps.
Stow in EMU Equipment Bag.

A/L1A1

- 3.3 Open CO2 Removal Receptacle door.

3.4 √CO2 VALVE – REMOVAL

- 3.5 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.

- 3.6 Close and latch CO2 Removal Receptacle door.

4. MASK PREBREATHE PREP

EV1,2

- 4.1 Relief Valve of 60-ft PHA Bags 1,2 →|← A/L PBA port
Route one 60-ft hose from PBA port to CEVIS (secure bag to handrail).

- 4.2 Position Heart Rate Watch on CEVIS.
Install EV1 PCMCIA card in CEVIS.

- 4.3 Verify prime and backup bungees are configured (blue or black only).

ISS IV

- 4.4 Perform {2.2050 CEVIS - ON LINE MODE OPERATIONS}, step 3 (SODF: MED OPS: NOMINAL: CMS), then:

EV1,2

- 4.5 Don Ergometer/CEVIS shoes.
Don other over-the-head garments.
Don TCU top.

- 4.6 Take one aspirin tablet (325 mg).

5. CONFIGURING FOR PHA COMMUNICATION (IF REQUIRED)

- 5.1 EACP Y-Cable ←|→ ATU 4,5

- 5.2 PHA Comm Cables →|← Headset Control Unit (HCU)

√HCU →|← HCU Extension Cable

- 5.3 HCU Extension Cable →|← ATU (near activity)

- 5.4 HCU → PTT (to alleviate noise)

ATU

- 5.5 pb PTT → Press
pb 1 → Press (Big Loop)
pb 5 → Press (Airlock)

1.210 EVA PREP USING SHUTTLE O2

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- √Display – '1G, 5T' and other loops, as required
- √Display – 'PTT'

INITIATING MASK PREBREATHE

WARNING

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

EV1,2 6. Verify black plates in top of Quick Don Mask are seated in silicon.

7. Don Quick Don Mask.

PHA 8. Quick Don Mask O2 control → EMERGENCY

9. Momentarily pull Mask away from face.

√O2 flow

IV Record mask prebreathe initiation GMT in block A on EVA
PREBREATHE CUE CARD, start timer, **P/B PET = 0:00**

EV 10. √Comm, as required

NOTE

Steps 11 to 13 should be performed in parallel.

EV-1,IV 11. Perform exercise per EVA EXERCISE PRESCRIPTION
steps 1 to 14 on EVA PREBREATHE CUE CARD.

EV-2 12. EMU POWERUP (BOTH EMUs)

UIA 12.1 √sw UIA PWR EV-1,2 (two) – OFF
√UIA PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: 850 to 950

C-Lk wall 12.2 Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk.

DCM 12.3 Open DCM Cover.
Affix cover to DCM with Velcro.

12.4 SCU →|← DCM

√SCU locked

EV2 DCM 12.5 sw POWER → BATT

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CAUTION

EMU must be on BATT power when UIA suit power is turned on.

PSA 12.6 √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU1,2 (two) – PWR

12.7 sw MAIN POWER → ON

√MAIN POWER LED – On

12.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA 12.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM 12.10 sw POWER → SCU

12.11 √STATUS: BATT VDC ≥ 20.3

UIA 13. OXYGEN EMU 1,2 vlv (two) → OPEN

NOTE

Steps 14 to 18 should be performed in parallel.

When EV1 Exercise complete

EV2,IV

14. Perform exercise per EVA EXERCISE PRESCRIPTION steps 1 to 14 on EVA PREBREATHE CUE CARD.

EV1 Both EMUs

15. Waist ring ←|→ HUT

Temporarily stow LTA.

16. Helmet ←|→ HUT

Temporarily stow helmet.

17. Gloves ←|→ EMU

Temporarily stow gloves.

18. Remove Dosimeter from in-flight garments.
Insert Dosimeter in LCVG left leg pocket.

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IV	EV1/EV2
<p>19. On the shuttle middeck MO32M Relief Valve of 90-ft PHA ← → LEH O2 5 Port</p> <p>20. LEH O2 5 vlv → CL</p> <p>23. Stow hose in 90-ft PHA Bag.</p> <p>24. Stow the following in E-Lk 90-ft PHA Bag EVA PREBREATHE CUE CARD Food and drink for EV crew, if desired.</p>	<p>21. If necessary, apply Medical Kit items. Refer to {5.110 APPROVED NON-EMU HARDWARE MATRIX}, all (SODF: ISS EVA SYS: REFERENCE), as required.</p> <p>22. Don MAG, TCU bottom, LCVG, biomed.</p> <div> <p>The diagram shows a human torso from the neck to the waist. Labels include 'R' for right, 'L' for left, 'G' for gallbladder, 'LC' for liver, and 'STERNAL NOTCH' at the top. A line with an arrow points from the 'STERNAL NOTCH' area down to the 'XYPHOID' area, indicating the placement of a biomedical device. The title 'EVA BIOMED PLACEMENT' is at the top of the diagram.</p> </div> <p>Figure 1.- Nondisposable Biomed Configuration.</p>

IV

25. CLOSING NODE 1 STBD HATCH

NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

When P/B PET = 50 minutes and 15 minutes post second EV crew exercise

25.1 √ **MCC-H** for Go to continue

25.2 √ Node 1 Stbd Hatch MPEV – CLOSED and uncapped

25.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

WARNING

Do not initiate depress until 50 minutes of mask prebreathe and 15 minutes post second EV crew exercise are complete. The depress time from 760 mmHg (14.7 psia) to 527 mmHg (10.2 psia) must be greater than 20 minutes.

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26. DEPRESSING TO 10.2 PSIA

EV1,2

26.1 Momentarily pull Mask away from face to verify positive O2 flow

* If no positive O2 flow, contact **MCC-H**.

NOTE

1. EV crew should perform steps 26.2 to 26.8 while IV is depressing Airlock to 10.2 psia (527 mmHg) in steps 26.9 to 26.23
2. EMU displays **O2 IS OFF** message during Airlock depress, sw DISP → PRO, as required.

DCM

26.2 ✓STATUS: **SOP P**: > 5410 (compare with gauge)

26.3 ✓Waist ring – open

26.4 Don LTA (attach donning handles as required).

If boot bladder manipulation required

26.5 Boot ←|→ Leg (sizing ring)

26.6 Pull up excess boot bladder around full circumference of boot disconnect.

WARNING

Keep bladder material clear of threads during reconnection of boot.

26.7 Boot →|← Leg (sizing ring)

26.8 Lock 1 → LOCK

✓All locks (three per boot) are engaged

IV

UIA

26.9 ✓DEPRESS PUMP ENABLE LED – On

UIA

26.10 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk

26.11 DEPRESS PUMP MAN ISOV → OPEN

✓Cab Press – Decreasing (use Vacuum Manometer or PCS)

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PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

26.12 Start depress PET clock.

Record start time in Block C of Prebreathe Cue Card.

When Cab Press < 14.1 psia (729 mmHg)

26.13 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

26.14 Crank Handle – Stowed position

NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

26.15 Monitor O2 using CSA-CP during depress.

Refer to Figure 2.

C-Lk

When Airlock is at 11.8 (610 mmHg)

26.16 DEPRESS PUMP MAN ISOV → CLOSED

26.17 Wait for depress PET = 15 minutes and O2 > 24.5 %

26.18 ✓ **MCC-H** for Go to continue

26.19 DEPRESS PUMP MAN ISOV → OPEN

26.20 Continue DEPRESS to 10.2 psia (527 mmHg).
Refer to Figure 2.

26.21 DEPRESS PUMP MAN ISOV → CLOSED

26.22 Verify O2 is between 23.5 and 28.8 %.

UIA

26.23 sw DEPRESS PUMP PWR → OFF

MCC-H/IV

26.24 Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

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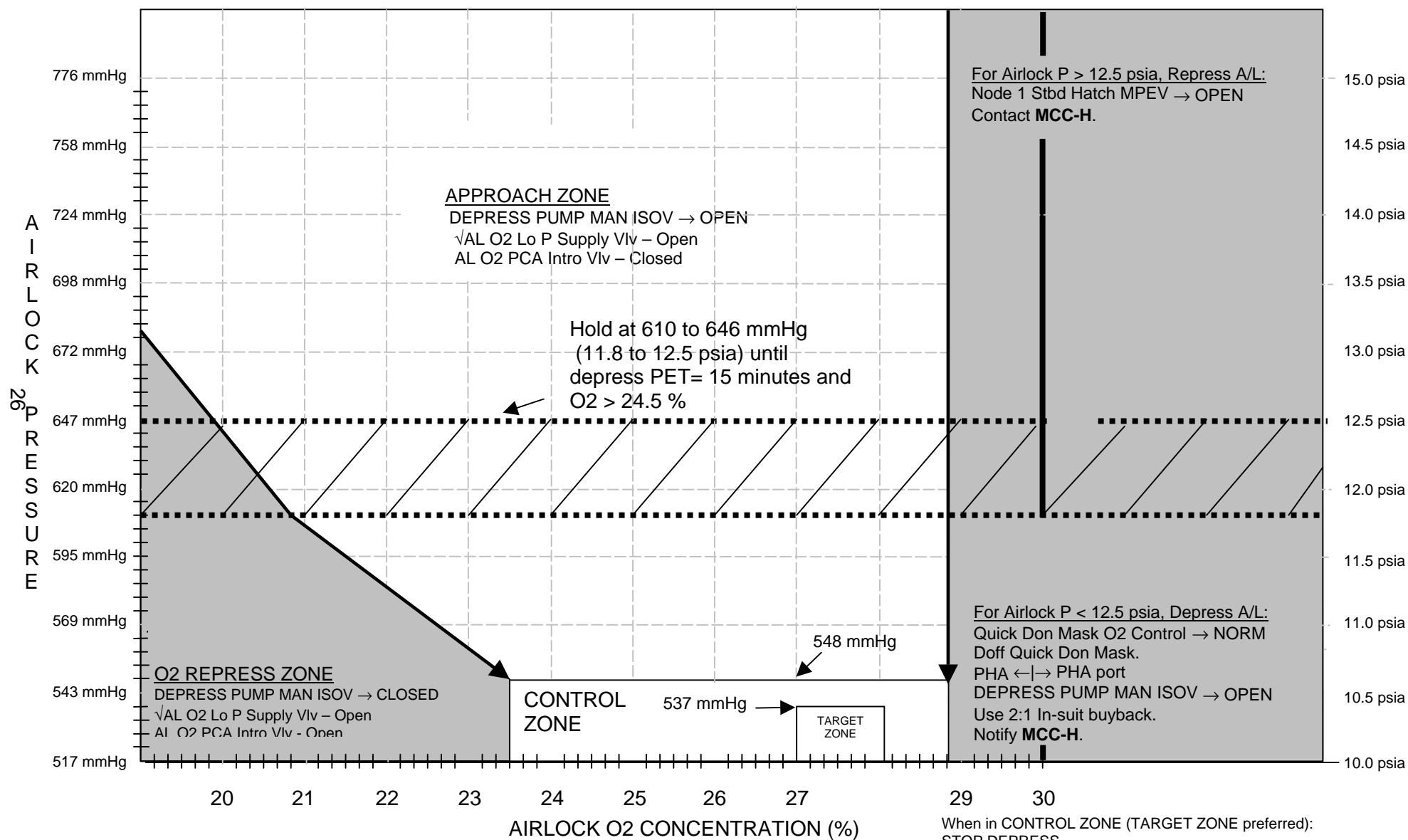


Figure 2.- 10.2 Airlock Depress Graph.

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WARNING

Do not terminate mask prebreathe until:

- Airlock at 10.2 psia (527 mmHg)
- P/B PET > 1:20
- 0:45 since finishing EV2 exercise
- Airlock O2 between 23.5 and 28.8 %

When mask prebreathe complete

- ☐☐☐☐ 27. Momentarily pull Mask away from face to verify positive O2 flow.

* If no positive O2 flow, contact **MCC-H**.

- PHA ☐☐☐☐ 28. Quick Don Mask O2 control → NORMAL

Record Mask Prebreathe Terminate P/B PET in block D on EVA PREBREATHE CUE CARD.

- ☐☐☐☐ 29. Doff Quick Don Mask.

- A/L1D2 ☐☐☐☐ 30. Relief Valve of 60-ft PHA ←|→ A/L PBA port
Install cap on A/L PBA port.
Close A/L PBA door.

- ☐☐☐☐ 31. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner

Biomed pigtail →|← electrical harness

- ☐☐☐☐ 32. Don comm cap.

NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

- DCM ☐☐☐☐ 33. sw COMM mode → PRI (hot mic to **MCC-H**)

- ☐☐☐☐ 34. √sw Comm FREQ – LOW

- ☐☐☐☐ 35. Verify biomed, EMU data, RF comm with **MCC-H**.

- ☐☐☐☐ 36. sw COMM mode → HL

- ☐☐☐☐ 37. Doff comm cap.

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- ☐☐☐☐ 38. Biomed pigtail \leftrightarrow electrical harness
- ATU4,5 ☐☐☐☐ 39. $\sqrt{\text{EACP Y-Cable} \rightarrow | \leftarrow \text{ATUs}}$
- EACP ☐☐☐☐ 40. $\sqrt{\text{EACP Y-Cable} \rightarrow | \leftarrow \text{EACP}}$
- sw PWR \rightarrow ON
- $\sqrt{\text{EMU1,2 mode sel (two) - DUAL}}$
- ATU4,5,6 ☐☐☐☐ 41. pb PTT \rightarrow Press
pb 1 \rightarrow Press (Big Loop)
pb 3 \rightarrow Press (Shuttle/ISS ICOM)
pb 5 \rightarrow Press (Airlock)
- $\sqrt{\text{Display - '1G, 3, 5T' other comm. loops as required}}$
 $\sqrt{\text{Display - 'DUAL'}}$

EMU DONNING (55 MINUTES)

NOTE

May be performed by EV1 and EV2 simultaneously.

- ☐☐☐☐ 42. $\sqrt{\text{EDDA latched}}$
- ☐☐☐☐ 43. If not taken previously, take one aspirin tablet (325 mg).
- ☐☐☐☐ 44. $\sqrt{\text{Suit arms aligned}}$
- ☐☐☐☐ 45. $\sqrt{\text{Gloves} \leftrightarrow \text{EMU}}$
 $\sqrt{\text{Wrist disconnects - op}}$
- ☐☐☐☐ 46. Stow IV glasses as required.
- ☐☐☐☐ 47. Don thumb loops.
- ☐☐☐☐ 48. $\sqrt{\text{Drink vlv position}}$
- ☐☐☐☐ 49. $\sqrt{\text{Biomed connector is outside of HUT}}$
- ☐☐☐☐ 50. Don HUT.
- ☐☐☐☐ 51. Release thumb loops.
- ☐☐☐☐ 52. $\sqrt{\text{Suit arms aligned}}$
- ☐☐☐☐ 53. Don EV glasses as required.
Don comm cap.
- ☐☐☐☐ 54. $\sqrt{\text{Comm}}$

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☐☐☐☐ 55. Biomed pigtail →|← electrical harness

☐☐☐☐ 56. LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

☐☐☐☐ 57. √Thermal cover clear of waist ring

☐☐☐☐ 58. Waist ring → engage position

☐☐☐☐ 59. Waist ring →|← HUT

√Waist ring locked

☐☐☐☐ 60. Remove donning handles.
Stow donning handles in EMU Equipment Bag.

☐☐☐☐ 61. Cover waist ring.

CAUTION

Pulling on blue bite valve to adjust position
can cause valve to release from stem.

☐☐☐☐ 62. √Drink vlv position

☐☐☐☐ 63. √Mic boom position

☐☐☐☐ 64. Don comfort gloves, wristlets.

☐☐☐☐ 65. Wrist rings → engage position

☐☐☐☐ 66. Don EV gloves.

√EV gloves locked

☐☐☐☐ 67. Tighten palm restraint straps.

☐☐☐☐ 68. √sw Glove heater (two) – OFF

☐☐☐☐ 69. √sw REBA – OFF (pull tab toward left arm of suit)

☐☐☐☐ 70. Lower arm power harness cables →|← Gloves

Stow slack under arm TMG.

☐☐☐☐ 71. √Cuff C/L position
√Wrist mirrors installed

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CAUTION

Flexible Ventilation Duct must be removed from Crewlock prior to taking EMU Fan to ON to avoid ice formation on UIA water lines.

- ☐☐☐☐ 72. Rotate Flexible Ventilation Duct out of C-Lk.

CAUTION

Minimize fan operation with O2 ACT – OFF (~2 minutes).

- DCM ☐☐☐☐ 73. sw FAN → ON

- ☐☐☐☐ 74. √Electrical harness clear of neck ring

- ☐☐☐☐ 75. Don helmet.

√Helmet locked

- DCM ☐☐☐☐ 76. O2 ACT → IV

- ☐☐☐☐ 77. √Helmet purge vlv – cl, locked

- DCM ☐☐☐☐ 78. PURGE vlv → cl (dn)

If EMU TV capability

- ☐☐☐☐ 79. Unstow EMU TV power cable.

- ☐☐☐☐ 80. EMU TV power cable ←|→ Ground plug

- ☐☐☐☐ 81. EMU TV power cable →|← EMU TV

- EV2 ☐☐☐☐ 82. Repeat steps 42 to 81 if donning performed serially.

EMU CHECK (5 MINUTES)

- Both ☐☐☐☐ 83. √Cooling

* If cooling insufficient

* | Slowly cycle Temp control vlv between 7 and Max C
* | while IV depresses and holds pump priming valve
* | on back of EMU (30 seconds minimum).

- DCM ☐☐☐☐ 84. Temp control vlv → as required

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- | | | | |
|---|-----|-------------------|--------------------------------|
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | 85. | √Wrist rings | – covered |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √Waist rings | – covered |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √sw WATER | – OFF (switch guard installed) |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √sw POWER | – SCU |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √sw FAN | – ON |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √sw Comm FREQ | – LOW |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √Helmet lights | – Operational |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √Helmet purge vlv | – cl, locked |
| DCM <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | | √PURGE vlv | – cl (dn) |

NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

- ☐☐☐☐ 86. sw DISP → STATUS until **LEAK CHECK?** displayed
sw DISP → YES

Follow displayed instructions.

* If **LEAKAGE HI** **SUIT P X.X**
* Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)}, all (SODF: ISS EVA SYS: EMU CONTINGENCY), then:
*

87. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA PREP/POST).

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1.215 EVA PREP USING ISS O2

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(170 Minutes)

OBJECTIVE:

Prepare for EVA using exercise prebreathe protocol. All of the oxygen required to support prebreathe is supplied from ISS high pressure oxygen tank.

1. EVA COMM AND AIRLOCK ENVIRONMENT CONFIG

- MCC-H/IV**
- 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
 - 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO).
 - 1.3 Prior to beginning step 7, perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, steps 1 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

- IV**
- If orbiter docked
- 1.4 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then:

EXERCISE PREBREATHE/PREP FOR DONNING (110 MINUTES)

IV 2. VERIFYING AIRLOCK EQUIPMENT

- 2.1 ✓PFE located in PFE locker
✓Pressure gauge needle is in green zone (800 to 900 psig)
- 2.2 ✓Three PHA Quick Don Masks available to support EVA Prep
- 2.3 ✓PBA Bottles and Quick Don Masks located in Airlock for every isolated crewmember
✓PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in Airlock
✓Oxygen Bottle pressure gauge needle \geq 3000 psig for each Bottle
- 2.4 ✓Two CSA-CPs located in Airlock
✓Battery power for both CSA-CPs
- AL10A1** 2.5 ✓Flexible Vent Duct attached to the Conditioned Air Supply connection
- 2.6 Set up and activate one PCS in Airlock.
✓SSC located in Airlock
3. ACTIVATING AIRLOCK CO2 REMOVAL
 - 3.1 Unstow new Metox Canisters (two).
Report barcodes to **MCC-H**.
 - 3.2 Remove Metox Canister caps.
Stow in EMU Equipment Bag.

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A/L1A1 3.3 Open CO2 Removal Receptacle door.

3.4 ✓ CO2 VALVE – REMOVAL

3.5 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.

3.6 Close and latch CO2 Removal Receptacle door.

4. MASK PREBREATHE PREP

EV1,2 4.1 Relief Valve of 120-ft PHA Bags 1,2 →|← PHA port
Route EV1 hose from PHA port to CEVIS (secure bag to handrail).

4.2 Tether hose for strain relief.

4.3 Position Heart Rate Watch on CEVIS.
Install EV1 PCMCIA card in CEVIS.

4.4 Verify prime and backup bungees are configured (blue or black only).

4.5 Perform {2.2050 CEVIS - ON LINE MODE OPERATIONS}, step 3
(SODF: MED OPS: NOMINAL: CMS), then:

4.6 Don Ergometer/CEVIS shoes.
Don other over-the-head garments.
Don TCU top.

4.7 Take one aspirin tablet (325 mg).

5. CONFIGURING FOR ONBOARD PHA COMM (IF REQUIRED)

5.1 EACP Y-Cable ←|→ ATU 4,5

5.2 PHA Comm Cables →|← Headset Control Unit (HCU)

✓ HCU →|← HCU Extension Cable

5.3 HCU Extension Cable →|← ATU (near activity)

5.4 HCU – PTT (to alleviate noise)

ATU 5.5 pb PTT → Press
pb 1 → Press (Big Loop)
pb 5 → Press (Airlock)

5.6 ✓ Display – '1G, 5T' and other loops, as required
✓ Display – 'PTT'

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INITIATING QUICK DON MASK PREBREATHE

WARNING

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

- EV1,2 PHA 6. Verify black plates in top of Quick Don Mask are seated in silicon.
7. Don Quick Don Mask.
8. Quick Don Mask O2 control → EMERGENCY
9. Momentarily pull Quick Don Mask away from face.

√O2 flow

Record Quick Don Mask prebreathe initiation GMT in block A on the EVA PREBREATHE CUE CARD, start timer, **P/B PET = 0:00**

10. √Comm, as required

NOTE

Steps 11 to 13 should be performed in parallel.

- EV-1,IV 11. Perform exercise per EVA EXERCISE PRESCRIPTION steps 1 to 2 and 6 to 12 on EVA PREBREATHE CUE CARD, then:

EV2 12. EMU POWERUP (BOTH EMUs)

- UIA 12.1 √sw PWR EV-1,2 (two) – OFF
 √PWR EV-1,2 LEDs (four) – Off
 √EMU O2 SUPPLY PRESS gauge: 850 to 950

- C-Lk wall 12.2 Remove SCU from stowage straps and pouches.
 Transfer SCU to E-Lk.

- DCM 12.3 Open DCM Cover
 Attach Cover to DCM with Velcro.

- 12.4 SCU →|← DCM

√SCU locked

- 12.5 sw POWER → BATT

CAUTION

EMU must be on BATT power when UIA suit power is turned on.

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PSA 12.6 √sw SUIT SELECT (two) – OFF
 √sw EMU MODE EMU1,2 (two) – PWR

12.7 sw MAIN POWER → ON

√MAIN POWER LED – On

12.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA 12.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM 12.10 sw POWER → SCU

12.11 √STATUS: BATT VDC ≥ 20.3

UIA 13. OXYGEN EMU 1,2 vlv (two) → OPEN

NOTE

Steps 14 to 18 should be performed in parallel.

When EV1 Exercise complete

EV2,IV 14. Perform exercise per EVA EXERCISE PRESCRIPTION steps
 1 to 2 and 6 to 12 on EVA PREBREATHE CUE CARD, then:

EV1 Both
 EMUs

15. Waist ring ←|→ HUT

Temporarily stow LTA.

16. Helmet ←|→ HUT
Temporarily stow helmet.

17. Gloves ←|→ EMU
Temporarily stow gloves.

18. Remove Dosimeter from in-flight garments.
Insert Dosimeter in LCVG left leg pocket.

IV 19. Stow the following in E-Lk
 EVA PREBREATHE Cue Card.
 Food and drink for EV crew, if desired.

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EV1,2

20. If necessary, apply Medical Kit items.
Refer to {5.110 APPROVED NON-EMU HARDWARE MATRIX}, all (SODF: ISS EVA SYS: REFERENCE), as required.
21. Don MAG, TCU bottom, LCVG, biomed.
Refer to Figure 1.

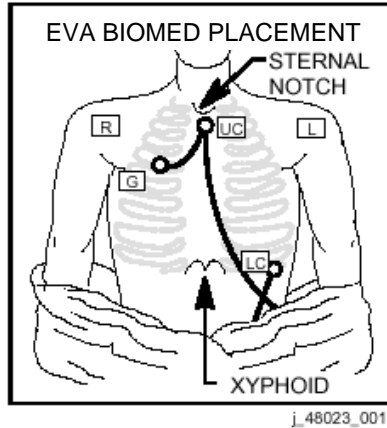


Figure 1.- Nondisposable Biomed Configuration.

IV

22. CLOSING NODE 1 STBD HATCH

NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

When P/B PET = 50 minutes and 15 minutes post second EV crew exercise

22.1 ✓ **MCC-H** for Go to continue

22.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped

22.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

WARNING

Do not initiate depress until 50 minutes of mask prebreathe and 15 minutes post second EV crew exercise are complete. The depress time from 760 mmHg (14.7 psia) to 527 mmHg (10.2 psia) must be greater than 20 minutes.

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23. DEPRESSING TO 10.2 PSIA

EV1,2
O2 flow

23.1 Momentarily pull Quick Don Mask away from face to verify positive

* If no positive O2 flow, contact **MCC-H**.

NOTE

1. EV crew should perform steps 23.2 to 23.8 while IV is depressing Airlock to 10.2 psia (527 mmHg) in steps 23.9 to 23.23.
2. EMU displays **O2 IS OFF** message during Airlock depress, sw DISP → PRO, as required.

DCM

23.2 ✓STATUS **SOP P**: > 5410 (compare with gauge)

23.3 ✓Waist ring – open

23.4 Don LTA (attach donning handles as required).

If boot bladder manipulation required

23.5 Boot ←|→ Leg (sizing ring)

23.6 Pull up excess boot bladder around full circumference of boot disconnect.

WARNING

Keep bladder material clear of threads during reconnection of boot.

23.7 Boot →|← Leg (sizing ring)

23.8 Lock 1 → LOCK

✓All locks (three per boot) are engaged

IV UIA 23.9 ✓DEPRESS PUMP ENABLE LED – On

UIA 23.10 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk 23.11 DEPRESS PUMP MAN ISOV → OPEN

✓Cab Press – Decreasing (use Vacuum Manometer or PCS)

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PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

- 23.12 Start depress PET clock.
Record start time in Block C of EVA PREBREATHE CUE CARD.

When Cab Press < 14.1 psia (729 mmHg)

- 23.13 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

- 23.14 Crank Handle – Stowed position

NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

- 23.15 Monitor O2 using CSA-CP during depress.
Refer to Figure 2.

When Airlock is at 11.8 (610 mmHg)

C-Lk

- 23.16 DEPRESS PUMP MAN ISOV → CLOSED

- 23.17 Wait for depress PET = 15 minutes and O2 > 24.5 %

- 23.18 ✓ **MCC-H** for Go to continue

- 23.19 DEPRESS PUMP MAN ISOV → OPEN

- 23.20 Continue DEPRESS to 10.2 psia (527 mmHg).
Refer to Figure 2.

- 23.21 DEPRESS PUMP MAN ISOV → CLOSED

- 23.22 Verify O2 is between 23.5 and 28.8 %.

- UIA 23.23 sw DEPRESS PUMP PWR → OFF

- MCC-H/IV** 23.24 Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

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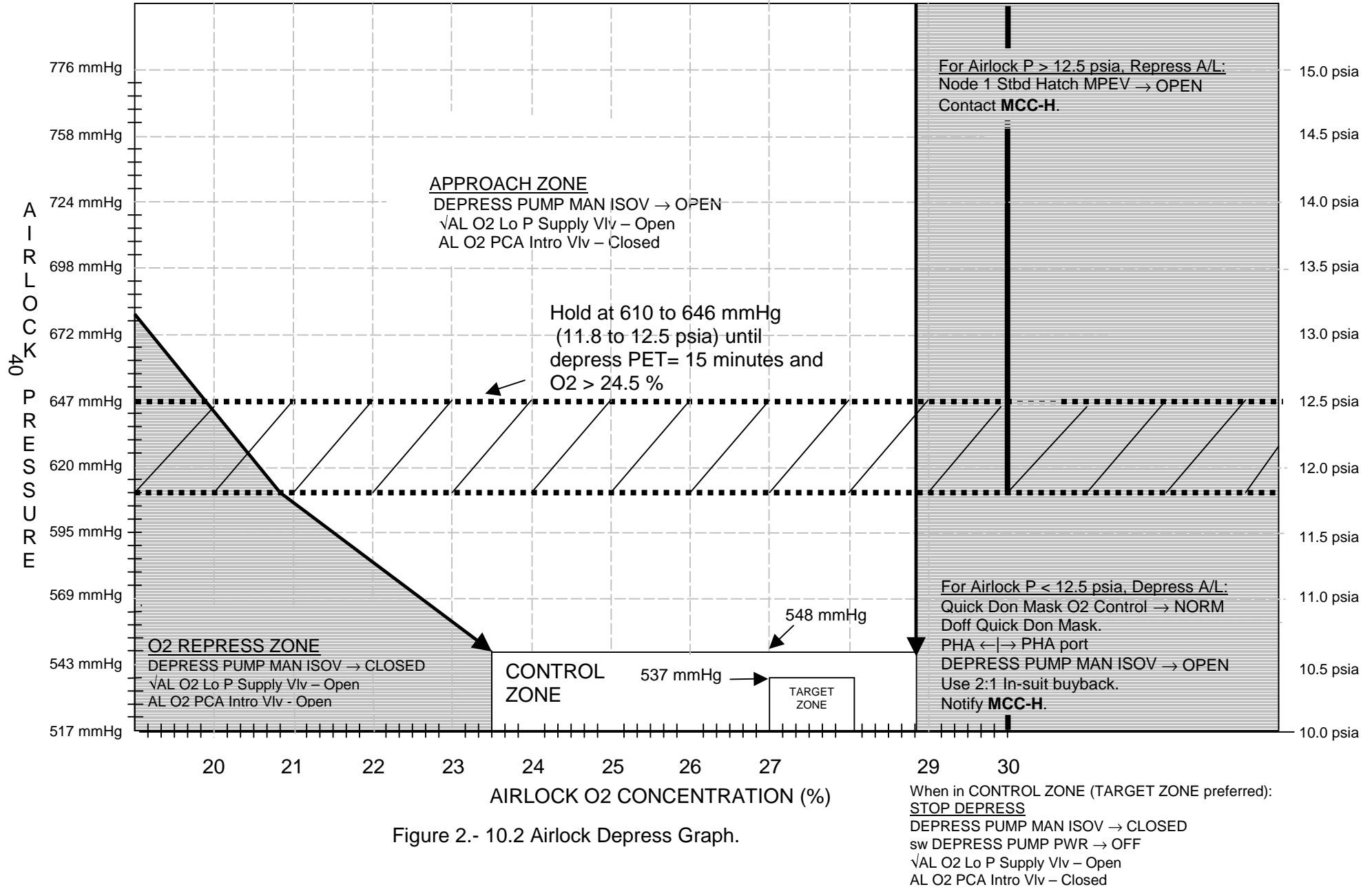


Figure 2.- 10.2 Airlock Depress Graph.

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WARNING

Do not terminate Quick Don Mask prebreathe until:

- Airlock at 10.2 psia (527 mmHg)
- P/B PET > 1:20
- 0:45 since finishing EV2 exercise
- Airlock O2 between 23.5 and 28.8 %

PHA When Quick Don Mask prebreathe complete

☐☐☐☐ 24. Momentarily pull Quick Don Mask away from face to verify positive O2 flow.

* If no positive O2 flow, contact **MCC-H**.

☐☐☐☐ 25. Quick Don Mask O2 control → NORMAL

Record Mask Prebreathe Terminate P/B PET in block D on EVA PREBREATHE CUE CARD.

☐☐☐☐ 26. Doff Quick Don Mask.

AL1D2 ☐☐☐☐ 27. Relief Valve of PHAs ←|→ PHA port

Install cap on PHA port.

☐☐☐☐ 28. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner
Biomed pigtail →|← electrical harness

☐☐☐☐ 29. Don comm cap.

NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

DCM ☐☐☐☐ 30. sw COMM mode → PRI (hot mic to **MCC-H**)

☐☐☐☐ 31. √sw Comm FREQ – LOW

☐☐☐☐ 32. Verify biomed, EMU data, RF comm with **MCC-H**.

☐☐☐☐ 33. sw COMM mode → HL

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☐☐☐☐ 34. Doff comm cap.

☐☐☐☐ 35. Biomed pigtail ←|→ electrical harness

ATU4,5 ☐☐☐☐ 36. √EACP Y-Cable →|← ATUs

EACP ☐☐☐☐ 37. √EACP Y-Cable →|← EACP

sw PWR → ON

√EMU1,2 mode sel (two) – DUAL

ATU4,5,6 ☐☐☐☐ 38. pb PTT → Press
pb 1 → Press (Big Loop)
pb 3 → Press (Shuttle/ISS ICOM)
pb 5 → Press (Airlock)

√Display – ‘1G, 3, 5T’ other comm. loops as required

√Display – ‘DUAL’

EMU DONNING (55 MINUTES)

NOTE

May be performed by EV1 and EV2 simultaneously.

☐☐☐☐ 39. √EDDA latched

☐☐☐☐ 40. Take one aspirin tablet (325 mg), if not taken previously.

☐☐☐☐ 41. √Suit arms aligned

☐☐☐☐ 42. √Gloves ←|→ EMU
√Wrist disconnects – op

☐☐☐☐ 43. Stow IV glasses as required.

☐☐☐☐ 44. Don thumb loops.

☐☐☐☐ 45. √Drink vlv position

☐☐☐☐ 46. √Biomed connector is outside of HUT

☐☐☐☐ 47. Don HUT.

☐☐☐☐ 48. Release thumb loops.

☐☐☐☐ 49. √Suit arms aligned

☐☐☐☐ 50. Don EV glasses as required.
Don comm cap.

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☐☐☐☐ 51. √Comm

☐☐☐☐ 52. Biomed pigtail →|← electrical harness

☐☐☐☐ 53. LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

☐☐☐☐ 54. √Thermal cover clear of waist ring

☐☐☐☐ 55. Waist ring → engage position

☐☐☐☐ 56. Waist ring →|← HUT

√Waist ring locked

☐☐☐☐ 57. Remove donning handles.
Stow donning handles in EMU Equipment Bag.

☐☐☐☐ 58. Cover waist ring.

CAUTION

Pulling on blue bite valve to adjust position
can cause valve to release from stem.

☐☐☐☐ 59. √Drink vlv position

☐☐☐☐ 60. √Mic boom position

☐☐☐☐ 61. Don comfort gloves, wristlets.

☐☐☐☐ 62. Wrist rings → engage position

☐☐☐☐ 63. Don EV gloves.

√EV gloves locked

☐☐☐☐ 64. Tighten palm restraint straps.

☐☐☐☐ 65. √sw Glove heater (two) – OFF

☐☐☐☐ 66. √sw REBA – OFF (pull tab toward left arm of suit)

☐☐☐☐ 67. Lower arm power harness cables →|← Gloves

Stow slack under arm TMG.

☐☐☐☐ 68. √Cuff C/L position
√Wrist mirrors installed

1.215 EVA PREP USING ISS O2

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CAUTION

Flexible Ventilation Duct must be removed from Crewlock prior to taking EMU Fan to ON to avoid ice formation on UIA water lines.

- ☐☐☐☐ 69. Rotate Flexible Ventilation Duct out of C-Lk.

CAUTION

Minimize fan operation with O2 ACT – OFF (~ 2 minutes).

- DCM ☐☐☐☐ 70. sw FAN → ON

- ☐☐☐☐ 71. √Electrical harness clear of neck ring

- ☐☐☐☐ 72. Don helmet.

√Helmet locked

- DCM ☐☐☐☐ 73. O2 ACT → IV

- ☐☐☐☐ 74. √Helmet purge vlv – cl, locked

- DCM ☐☐☐☐ 75. PURGE vlv → cl (dn)

If EMU TV capability

- ☐☐☐☐ 76. Unstow EMU TV power cable.

- ☐☐☐☐ 77. EMU TV power cable ←|→ Ground plug

- ☐☐☐☐ 78. EMU TV power cable →|← EMU TV

- EV2 ☐☐☐☐ 79. Repeat steps 39 to 78 if donning performed serially.

EMU CHECK (5 MINUTES)

- Both ☐☐☐☐ 80. √Cooling

* If cooling insufficient

* | Slowly cycle Temp control vlv between 7 and Max C
* | while IV depresses and holds pump priming valve
* | on back of EMU (30 seconds minimum).

- DCM ☐☐☐☐ 81. Temp control vlv → as required

- ☐☐☐☐ 82. √Wrist rings – covered

- ☐☐☐☐ √Waist rings – covered

- DCM ☐☐☐☐ √sw WATER – OFF (switch guard installed)

1.215 EVA PREP USING ISS O2

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<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw POWER	– SCU
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw FAN	– ON
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw Comm FREQ	– LOW
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√Helmet lights	– Operational
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√Helmet purge vlv	– cl, locked
DCM <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√PURGE vlv	– cl (dn)

NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

- ☐☐☐☐ 83. sw DISP → STATUS until **LEAK CHECK?** displayed
sw DISP → YES, follow displayed instructions.

* If **LEAKAGE HI** **SUIT P X.X**
* | Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)},
* | all (SODF: ISS EVA SYS: EMU CONTINGENCY), then:

84. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA PREP/POST).

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1.220 EMU PURGE

(ISS EVA SYS/7A - ALL/FIN 4) Page 1 of 2 pages

OBJECTIVE:

Purge cabin air from the EMU prior to in-suit prebreathe.

NOTE

Flex arms and legs periodically and avoid overcooling during purge/prebreathe.

BOTH DCM

1. O2 ACT → PRESS
2. Verify no EMU fit issues.
3. PURGE vlv → op (up), begin 12-minute purge clock

For exercise protocol, record GMT purge start time in block E of EVA PREBREATHE CUE CARD, inform **MCC-H**.

For campout protocol, record GMT purge start time here.

GMT (PURGE INIT:) ____/____:____ ____

MCC-H/IV

4. INHIBITING ISS RAPID DEPRESS RESPONSE AND ALARM
 - 4.1 Perform {1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION}, step 1 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:
 - 4.2 Verify Russian Segment Rapid Depress Response inhibited

WARNING

To ensure sufficiently low PPN2 levels in the EMU, do not repress Equipment Lock until 5 minutes of purge is complete.

When 5 minutes of purge complete

NOTE

1. If shuttle docked, airlock repress may cause shuttle dP/dT alarm.
2. Airlock repress will take approximately 7 minutes with the Node Stbd Hatch MPEV open.

IV

5. Inform shuttle crew of airlock repress initiation, as required.
6. Verify with **MCC-H** step 4 complete and **GO** for repress. Node 1 Stbd Hatch MPEV → throttled Open to Close (as required)
7. Open Node 1 Stbd Hatch per decal.

1.220 EMU PURGE

(ISS EVA SYS/7A - ALL/FIN 4) Page 2 of 2 pages

BOTH DCM	<p>When 12-minute purge complete</p> <ol style="list-style-type: none">PURGE vlv → cl (dn)O2 ACT → IVFor Exercise protocol, record GMT of in-suit prebreathe start time on block F of EVA PREBREATHE CUE CARD. For Campout protocol, record GMT of in-suit prebreath start time here. <div>GMT (IN-SUIT P/B INIT:) ____/____:____ ____</div>
MCC-H/IV	<ol style="list-style-type: none"><u>ENABLING ISS RAPID DEPRESS RESPONSE AND ALARM</u> Perform {1.110 ISS AIRLOCK 10.2 PSIA OPERATIONS TERMINATION}, step 2 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:Go to {1.225 EMU PREBREATHE} (SODF: ISS EVA SYS: EVA PREP/POST).

1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/PAPER ON ISS) Page 1 of 4 pages

I

OBJECTIVE:

To perform the required in-suit prebreathe prior to an EVA.

1. Monitor prebreathe clock.

Protocol	Prebreathe Duration
Exercise	01:00
Campout	00:40
14.7 psi	04:00

If 14.7 psi protocol

2. $\sqrt{\text{MCC-H}}$ for additional EMU water dump requirements

PHA

3. Depress Quick Don Mask O2 control to bleed down line.
Install caps on PHA fittings.
4. Use spare Quick Don Mask to bleed down 90-ft PHA (if using shuttle O2)
Spare Quick Don Mask \leftarrow | \rightarrow 90-ft PHA
5. Stow PHA Quick Don Masks in PHA Bags.
6. Return additional PBAs retrieved from other modules to original stowage lockers.
Inform **MCC-H** PBAs are restowed.
7. Install miniworkstation, tools, waist tethers, BRTs as required on EMUs.
8. Egress EDDA.
Stow EDDA handles.

SAFER DONNING (30 MINUTES)

IV

9. Remove SAFER from Stowage Bag.
Remove Stowage Straps (two) from thruster towers.
Stow Stowage Straps in EMU Equipment Bag.
Unfold thruster towers.
10. Inspect:
Thruster tower hinges
Tower latches

 $\sqrt{\text{TMG}}$ not blocking thrusters
11. $\sqrt{\text{TMG}}$ clear from SAFER striker plate on EMU PLSS
12. Remove Inhibitor.
Close, fasten port cover.
Stow Inhibitor in EMU Equipment Bag.

1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/PAPER ON ISS) Page 2 of 4 pages

13. MAN ISOL vlv → OP (dn)
14. Latch → PRELOAD
15. Latch ↶ to recess butterfly in housing.

CAUTION

Latch ↶ past softstop can bind latch.

16. Latch ↶ to softstop.

If required

17. Latch ↶ to align latch collar with square bolt head.
18. Latch → ENG
19. PLSS →|← thruster towers
20. Push latch in and ↷ (~90°).

- * If latch will not engage
- * | Latch → PRELOAD
- * | Latch ↶
- * | Return to step 16.

21. Latch → PRELOAD
22. Latch ↷ until ratcheting.

CAUTION

Latch ↷ may disengage SAFER.

23. Continue ratcheting until lock marking on latch and tower aligned.
24. Latch → LCK
25. ✓ Access to HCM deploy lever
✓ TMG not blocking thrusters
26. Repeat steps 9 to 25 for SAFER 2.

A/L1A1

27. DEACTIVATING CO2 REMOVAL
27.1 Rotate EDDA open.

27.2 Open CO2 Removal Receptacle door.

27.3 Remove Metox canisters from CO2 Removal Receptacle.

1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/PAPER ON ISS) Page 3 of 4 pages

- 27.4 Unstow Metox canister caps from EMU Equipment Bag.
- 27.5 Install caps on Metox canisters.
- 27.6 Report canister barcode to **MCC-H** as comm permits.
- 27.7 Temporarily stow Metox canisters for future regeneration or use.
- 27.8 Close and latch CO2 Removal Receptacle door.
- 27.9 Rotate EDDA closed.

PREPARING FOR DEPRESS (10 MINUTES)

IV

- 28. Remove loose equipment from C-Lk.

√EVA tools and ORUs installed in C-Lk as required for EVA

- 29. sw REBA → ON, pull tab toward right arm of suit

If EMU TV capability

- 30. pb EMU TV power → Press

√Green LED – On

EV

- 31. Ingress C-Lk.

C-Lk

- 32. √DEPRESS PUMP MAN ISOV – CLOSED

IV

DCM

- 33. Remove water switch guard (two).
Stow water switch guard in EMU Equipment Bag.

IV

- 34. Egress C-Lk.

CAUTION

Verify EV crew is clear of hatch mechanism.

- 35. IV Hatch → CLOSE, lock
- 36. √IV Hatch equalization valve – OFF (√cap remains removed)
- 37. √EMERGENCY MPEV – CLOSED

1.225 EMU PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 6/HC/PAPER ON ISS) Page 4 of 4 pages

		When in-suit prebreathe time complete	
PCS		38.	Airlock: ECLSS: PCA: VRIV <div>AL PCA VRIV</div> 'Open' cmd Arm (✓Status – Armed) cmd Open (✓Position – Open)
EV	UIA	39.	✓sw DEPRESS PUMP PWR – OFF ✓DEPRESS PUMP ENABLE LED – On On MCC-H GO , go to CREWLOCK DEPRESS portion of {CREWLOCK DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA SYS: EVA PREP/POST).

HOOK
VELCROHOOK
VELCRO**CREWLOCK DEPRESS/REPRESS CUE CARD**

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CREWLOCK DEPRESS (30 MINUTES) (45 MINUTES FOR EXERCISE PROTOCOL)

- When prebreathe complete
- | | |
|-----------|--|
| DCM | 1. √sw Comm FREQ – LOW |
| | 2. sw COMM mode → PRI |
| UIA | 3. sw DEPRESS PUMP PWR → ON
(wait 10 seconds for complete startup) |
| C-Lk | 4. DEPRESS PUMP MAN ISOV → OPEN, (EV expect alert tone)
Start Depress PET clock.
Monitor Suit P gauge < 5.5. |
| | ***** |
| | * If gauge > 5.5 |
| | * Stop depress, √ MCC-H. |
| | ***** |
| DCM | 5. C-Lk at 6.0, (EV expect alert tone) |
| | When C-Lk at 5.0 psia (259 mm Hg) |
| C-Lk | 6. DEPRESS PUMP MAN ISOV → CLOSED, (EV expect alert tone) |
| DCM | 7. sw DISP → STATUS until LEAK CHECK? displayed
sw DISP → YES, follow displayed instructions |
| | ***** |
| | * If LEAKAGE HI SUIT P X.X |
| | * Perform {2.110 FAILED LEAK CHECK (5 PSIA) } |
| | * (SODF: ISS EVA SYS: EMU CONTINGENCY), then: |
| | ***** |
| | 8. √O2 ACT – EVA |
| | For Exercise Protocol, hold at 5.0 psia until Depress PET = 00:25, then: |
| C-Lk | 9. DEPRESS PUMP MAN ISOV → OPEN, (EV expect alert tone) |
| IV A/L1A2 | 10. Emergency MPEV → Open
Monitor SUIT P gauge < 5.5. |
| | ***** |
| | * If gauge > 5.5 |
| | * Stop depress, √ MCC-H. |
| | ***** |
| | When C-Lk at 2.0 psia (103 mm Hg) |
| C-Lk | 11. DEPRESS PUMP MAN ISOV → CLOSED |
| UIA | 12. sw DEPRESS PUMP PWR → OFF |
| C-Lk | 13. Attach waist tethers to C-Lk D-ring for egress. |
| DCM | When C-Lk dP/dT ~ 0, (EV expect alert tone) |
| | When EV Hatch ΔP < 0.5 psi (26 mm Hg) |
| C-Lk | 14. EV Hatch → open, stow |
| IV A/L1A2 | 15. Emergency MPEV → Closed |

POST DEPRESS (5 MINUTES)

- | | |
|--------|---|
| DCM | 1. sw POWER → BATT (stagger switch throws), expect warning tone
(IV record GMT ____/____:____) EVA PET = 00:00 |
| UIA | 2. sw PWR EV-1,2 (two) → OFF
√PWR EV-1,2 LEDs (four) – Off |
| DCM | 3. SCU ← → DCM |
| | 4. Install DCM cover. |
| | 5. Stow SCU in pouch. |
| C-Lk | 6. √DEPRESS PUMP MAN ISOV – CLOSED |
| DCM | 7. Temp control vlv → Max H |
| | 8. sw WATER → ON |
| | 9. √DCM blank, BITE – off |
| | 10. Temp control vlv → 3 to Max C |
| | 11. √STATUS, Compare to Cuff Checklist page 1 (IV record) |
| | 12. Visors as required. |
| IV PCS | 13. Airlock: ECLSS: PCA: VRIV
cmd Close (√Position – Closed) |
| | 14. Go to { CREWLOCK EGRESS } (SODF: ISS EVA SYS: CUFF
CHECKLIST) page 34 or EVA specific timeline. |

EVA-1a/7A - ALL/F

HOOK
VELCRO

HOOK
VELCRO

CREWLOCK DEPRESS/REPRESS CUE CARD

(ISS EVA SYS/7A - ALL/FIN 6)Page 2 of 2 pages

PRE REPRESS (5 MINUTES)

- DCM
1. √SCU →|← DCM
2. √sw WATER – OFF for 2 minutes
3. √EV Hatch closed, locked
4. Waist tethers ←|→ C-Lk D-ring, attach to EMUs
- UIA
5. √OXYGEN EMU1,2 vlv (two) – OPEN
6. sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS = 18.0 to 19.0
- DCM
7. sw POWER → SCU, (EV expect warning tone)

CREWLOCK REPRESS (10 MINUTES)

WARNING

If on SOP, leave O2 ACT – EVA thru C-Lk repress.

- DCM
1. O2 ACT → PRESS
2. sw COMM mode → HL
- C-Lk
3. √EV Hatch MPEV – CLOSED
4. Notify shuttle crew of possible -dP/dT alarm during repress.
- IV Hatch equalization vlv → throttle OFF to NORM (as required),
- (EV expect alert tone)
- (IV record GMT_____/_____:_____)
- DCM
5. C-Lk at 4.0, (EV expect alert tone)
- When C-Lk at 5.0 (259 mm Hg)
- C-Lk
6. IV Hatch equalization valve → OFF, (EV expect alert tone)
- Wait 2 minutes for C-Lk pressure to stabilize, then:
- IV
- PCS
7. Airlock: ECLSS
- Record Crew Lock Press: _____mmHg (P1)
- Wait 1 minute, then record again: _____mmHg (P2)
- *****
- * If $\Delta P \geq 9$ mmHg (where $\Delta P = P1-P2$)
- * | Go to {4.150 CREWLOCK LARGE LEAK
- * | RESPONSE} (SODF: ISS EVA SYS:
- * | EMERGENCY).
- * |
- * If $\Delta P > 2$ mmHg (where $\Delta P = P1-P2$)
- * | Go to {2.205 CREWLOCK SMALL LEAK
- * | RESPONSE} (SODF: ISS EVA SYS: AIRLOCK
- * | CONTINGENCY).
- * |
- *****
8. √sw Gloves heaters – OFF, gloves clean
- WARNING

1. If CUFF 1 symptoms resolving upon repress, report as CUFF 2.

2. If any DCS, leave O2 ACT – PRESS.
- DCM
9. O2 ACT → IV
- C-Lk
10. IV Hatch equalization vlv → NORM, (EV expect alert tone)
- DCM
- When C-Lk dP/dT ~ 0, (EV expect alert tone)
11. Go to {1.240 POST EVA} (SODF: ISS EVA SYS: EVA PREP/POST).

1.235 EMU STATUS

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55

EMU STATUS														
	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2		
TIME EV														
TIME LF														
% PWR														
% O2														
SUIT P			Report status to MCC when: <ul style="list-style-type: none">Any parameter outside normal rangeTIME LF ≤ requiredLimiting consumable changes (PWR↔O2)ΔTIME LF between EV1 and EV2 ≥1 hour											
O2 P														
SOP P														
SUBLM P														
BAT VDC														
BAT AMP			NORMAL STATUS											
RPM														
CO2			<ul style="list-style-type: none">O2 POS		EVA									
H2O TEMP			<ul style="list-style-type: none">TIME EV											
H2O GP			<ul style="list-style-type: none">TIME LF/limiting consum		HR:MIN left since PWR-BATT									
H2O WP			% O2(PWR) LF											
GAUGE			SUIT P		4.2 to 4.4 psid									
			O2 P											
			SOP P		150 to 950 psid				TIME EV					
			SUBLM P		5410 to 6800 psia				TIME LF					
			BAT VDC		2.0 to 4.2 psia				% PWR					
			BAT AMP		≥ 16.7				% O2					
			RPM		3.0 to 4.0									
			RPM		18.0 to 20.0 k				TIME EV					
			CO2		0.2 to 2.0 mmHg				TIME LF					
			H2O TEMP		32 to 75 degF				% PWR					
			H2O GP/WP		14.0 to 16.0 psid				% O2					

1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 2 of 6 pages

EMU STATUS												
	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when:									
O2 P			<ul style="list-style-type: none"> Any parameter outside normal range 									
SOP P			<ul style="list-style-type: none"> TIME LF \leq required 									
SUBLM P			<ul style="list-style-type: none"> Limiting consumable changes (PWR\leftrightarrowO2) 									
BAT VDC			<ul style="list-style-type: none"> ΔTIME LF between EV1 and EV2 \geq 1 hour 									
BAT AMP												
RPM			NORMAL STATUS									
CO2			EVA									
H2O			HR:MIN left since PWR-BATT									
TEMP			HR:MIN remaining at present use rate									
H2O GP			Displayed if not limiting consumable									
H2O WP			4.2 to 4.4 psid									
GAUGE			150 to 950 psid									
			5410 to 6800 psia									
			2.0 to 4.2 psia									
			≥ 16.7									
			3.0 to 4.0									
			18.0 to 20.0 k									
			0.2 to 2.0 mmHg									
			32 to 75 degF									
			14.0 to 16.0 psid									
			TIME EV									
			TIME LF									
			% PWR									
			% O2									
			TIME EV									
			TIME LF									
			% PWR									
			% O2									

1.235 EMU STATUS

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EMU STATUS												
	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when: <ul style="list-style-type: none"> Any parameter outside normal range TIME LF \leq required Limiting consumable changes (PWR\leftrightarrowO2) ΔTIME LF between EV1 and EV2 \geq1 hour 									
O2 P												
SOP P												
SUBLM P												
BAT VDC												
BAT AMP			NORMAL STATUS EVA									
RPM												
CO2			HR:MIN left since PWR-BATT HR:MIN remaining at present use rate Displayed if not limiting consumable									
H2O TEMP												
H2O GP			4.2 to 4.4 psid									
H2O WP												
GAUGE			150 to 950 psid									
			5410 to 6800 psia									
			2.0 to 4.2 psia									
			≥ 16.7									
			3.0 to 4.0									
			18.0 to 20.0 k									
			0.2 to 2.0 mmHg									
			32 to 75 degF									
			14.0 to 16.0 psid									

1.235 EMU STATUS

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EMU STATUS												
	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when:									
O2 P												
SOP P												
SUBLM P												
BAT VDC			• Any parameter outside normal range									
BAT AMP												
RPM			• TIME LF ≤ required									
CO2												
H2O TEMP			• Limiting consumable changes (PWR↔O2)									
H2O GP												
H2O WP			• ΔTIME LF between EV1 and EV2 ≥ 1 hour									
GAUGE												
			NORMAL STATUS									
			EVA									
			HR:MIN left since PWR-BATT									
			HR:MIN remaining at present use rate									
			Displayed if not limiting consumable									
			4.2 to 4.4 psid									
			150 to 950 psid									
			5410 to 6800 psia									
			2.0 to 4.2 psia									
			≥ 16.7									
			3.0 to 4.0									
			18.0 to 20.0 k									
			0.2 to 2.0 mmHg									
			32 to 75 degF									
			14.0 to 16.0 psid									
			TIME EV									
			TIME LF									
			% PWR									
			% O2									
			TIME EV									
			TIME LF									
			% PWR									
			% O2									

1.235 EMU STATUS

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 5 of 6 pages

EMU STATUS															
	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2			
TIME EV															
TIME LF															
% PWR															
% O2															
SUIT P			Report status to MCC when: <ul style="list-style-type: none">Any parameter outside normal rangeTIME LF ≤ requiredLimiting consumable changes (PWR↔O2)ΔTIME LF between EV1 and EV2 ≥1 hour												
O2 P															
SOP P															
SUBLM P															
BAT VDC															
BAT AMP			<u>NORMAL STATUS</u> EVA HR:MIN left since PWR-BATT HR:MIN remaining at present use rate Displayed if not limiting consumable 4.2 to 4.4 psid 150 to 950 psid 5410 to 6800 psia 2.0 to 4.2 psia ≥ 16.7 3.0 to 4.0 18.0 to 20.0 k 0.2 to 2.0 mmHg 32 to 75 degF 14.0 to 16.0 psid												
RPM							<ul style="list-style-type: none">O2 POS								
CO2							<ul style="list-style-type: none">TIME EV								
H2O TEMP							<ul style="list-style-type: none">TIME LF/limiting consum								
H2O GP							% O2(PWR) LF								
H2O WP							SUIT P								
GAUGE							O2 P				TIME EV				
							SOP P				TIME LF				
							SUBLM P				% PWR				
							BAT VDC				% O2				
			BAT AMP												
			RPM				TIME EV								
			CO2				TIME LF								
			H2O TEMP				% PWR								
		H2O GP/WP				% O2									

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	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2	EV1	EV2
TIME EV												
TIME LF												
% PWR												
% O2												
SUIT P			Report status to MCC when: • Any parameter outside normal range • TIME LF ≤ required • Limiting consumable changes (PWR↔O2) • ΔTIME LF between EV1 and EV2 ≥1 hour									
O2 P												
SOP P												
SUBLM P												
BAT VDC												
BAT AMP			<u>NORMAL STATUS</u>									
RPM			• O2 POS		EVA							
CO2			• TIME EV		HR:MIN left since PWR-BATT							
H2O TEMP			• TIME LF/limiting consum		HR:MIN remaining at present use rate							
H2O GP			% O2(PWR) LF		Displayed if not limiting consumable							
H2O WP			SUIT P		4.2 to 4.4 psid							
GAUGE			O2 P		150 to 950 psid	TIME EV						
			SOP P		5410 to 6800 psia	TIME LF						
			SUBLM P		2.0 to 4.2 psia	% PWR						
			BAT VDC		≥ 16.7	% O2						
			BAT AMP		3.0 to 4.0							
			RPM		18.0 to 20.0 k	TIME EV						
			CO2		0.2 to 2.0 mmHg	TIME LF						
			H2O TEMP		32 to 75 degF	% PWR						
			H2O GP/WP		14.0 to 16.0 psid	% O2						

1.240 POST EVA

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I

(80 Minutes)

OBJECTIVE:

Doff EMUs after an EVA and perform required maintenance activities.

CAUTION

Verify EV crew is clear of hatch mechanism.

IV

When equalization complete

1. Open IV Hatch per decal.

IV Hatch equalization valve → OFF

* If required, IV use damp towel to clean gloves.

SAFER DOFFING (5 MINUTES)

IV

SAFER

☐☐☐☐

2. Latch → ENG

☐☐☐☐

3. Latch ↶ until release (~90 deg).

☐☐☐☐

4. PLSS ←|→ Thruster Towers

☐☐☐☐

5. Install Inhibitor (not required if SAFER has been used).

☐☐☐☐

6. Temporarily stow SAFER in C-Lk.

☐☐☐☐

7. Repeat steps 2 to 6 for SAFER 2.

SUIT DOFFING (25 MINUTES)

☐☐☐☐

8. Engage EMU in EDDA.

☐☐☐☐

9. Remove tools, as required.

WARNING

Do not doff EMU if DCS symptoms resolved during REPRESS. √MCC-H via PMC

BOTH DCM

☐☐☐☐

10. O2 ACT → OFF

☐☐☐☐

11. PURGE vlv → op (up)

IV

☐☐☐☐

12. Install WATER switch guards (two).

If EMU TV capability

☐☐☐☐

13. pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

1.240 POST EVA

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PLSS ☐☐☐☐ 14. sw REBA → OFF (toward left arm of suit)

If EMU TV capability

☐☐☐☐ 15. EMU TV Power Cable ←|→ EMU TV
EMU TV Power Cable →|← Ground Plug

☐☐☐☐ 16. Lower Arm Cables ←|→ Gloves

Stow lower arm and glove cable connectors under TMG.

DCM ☐☐☐☐ 17. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

Stow gloves in EMU Equipment Bag.

☐☐☐☐ 18. Helmet ←|→ EMU

Temporarily stow helmet.

☐☐☐☐ 19. sw COMM mode → OFF

☐☐☐☐ 20. Doff comm cap.
Doff EV glasses.

DCM ☐☐☐☐ 21. sw FAN → OFF

☐☐☐☐ 22. Waist Ring ←|→ HUT

☐☐☐☐ 23. LCVG ←|→ Multiple Water Connector

☐☐☐☐ 24. Biomed Pigtail ←|→ Electrical Harness

☐☐☐☐ 25. √Wrist disconnects – op

EV ☐☐☐☐ 26. Doff HUT.

☐☐☐☐ 27. Doff LTA.
Temporarily stow LTA.

☐☐☐☐ 28. Doff biomed, LCVG, TCUs.

☐☐☐☐ 29. Doff MAG.
Seal MAG in Ziplock Bag and dispose.

☐☐☐☐ 30. Remove dosimeter from LCVG.

☐☐☐☐ 31. Biomed Pigtail ←|→ Signal Conditioner

Stow biomed pigtail in EMU Servicing Kit.

1.240 POST EVA

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IV ATU 4,5 ☐☐☐☐ 32. pb HANG UP → Press
pb 1(2,3,4,5) → Press

EACP ☐☐☐☐ 33. sw PWR → OFF

A/L1A ☐☐☐☐ 34. Rotate Flexible Ventilation Duct into C-Lk.
Secure duct with Velcro strap.

EVA COMM AND AIRLOCK ENVIRONMENT DECONFIG

☐☐☐☐ 35. Perform shuttle EVA COMM DECONFIG, (FDF: EVA:
EVA PREP) if required, then:

MCC-H/IV ☐☐☐☐ 36. Perform {2.210 AUDIO SUBSYSTEM
DECONFIGURATION FROM UHF OPS}, all (SODF:
C&T: NOMINAL: AUDIO), then:

☐☐☐☐ 37. Perform {2.702 UHF 1 ORU DEACTIVATION}, all
(SODF: C&T: NOMINAL: UHF), then:

WATER RECHARGE/METOX REGEN INIT (15 MINUTES)

IV If EMU Water Recharge required per timeline
☐☐☐☐ 38. Perform {1.505 EMU WATER RECHARGE},
Initiate steps, (SODF: ISS EVA SYS: EMU
MAINTENANCE), then:

If Metox regeneration required per timeline
☐☐☐☐ 39. Remove Metox from EMUs.
Install EMU Vent Port Plugs on CCC ports.
☐☐☐☐ 40. Perform {1.510 METOX REGENERATION}, all
(SODF: ISS EVA SYS: EMU MAINTENANCE),
then:
☐☐☐☐ 41. ✓PLSS thermal cover on back of EMU – closed

OXYGEN RECHARGE VERIFICATION (5 MINUTES)

DCM ☐☐☐☐ 42. STATUS:

☐☐☐☐ 43. Continue charge until O2 P > 850 psi.
Record O2 P.
Report to **MCC-H** as comm permits.

EMU	O2 P

UIA ☐☐☐☐ 44. OXYGEN EMU 1,2 vlv (two) → CLOSE

1.240 POST EVA

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- PCS ☐☐☐☐ 45. [RECONFIGURING O2 SYSTEM](#)
- 45.1 C&W Summ

'Event Code Tools'
- sel Inhibit
-
- input Event Code – 6 6 0 3 (O2 UIA Supply Pressure Low-A/L)
- cmd** Arm
cmd Execute
- 45.2 sel Suppress
-
- input Event Code – 5 0 1 3 (Primary INT MDM Fail-LAB)
- cmd** Arm
cmd Execute
- 45.3 Airlock: ECLSS: O2 Hi Pressure Supply Valve
- cmd** Close (√Actual Position – Closed)

[SAFER STOW \(5 MINUTES\)](#)

- SAFER ☐☐☐☐ 46. Latch → PRELOAD
- ☐☐☐☐ 47. Latch ↻ until lock markings on latch and tower recess aligned.
- ☐☐☐☐ 48. Push in latch.
- Latch → LCK
- ☐☐☐☐ 49. Fold thruster towers, install stowage straps (two).
- ☐☐☐☐ 50. MAN ISOL vlv → CL (up)
- ☐☐☐☐ 51. Stow SAFER in SAFER stowage bag in C-Lk.

[WATER RECHARGE TERM \(5 MINUTES\)](#)

If EMU Water Recharge required per timeline

- ☐☐☐☐ 52. Perform {1.505 EMU WATER RECHARGE},
Terminate steps, (SODF: ISS EVA SYS: EMU
MAINTENANCE), then:

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☐☐☐☐ 53. POWERING DOWN EMUs

NOTE

When performing EMU powerdown, SCUs may remain connected to the EMUs if additional EMU operations are planned.

UIA

53.1 sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off

√PWR EV-1,2 VOLTS: ~00.0

53.2 √OXYGEN EMU 1,2 vlv (two) – CLOSE

PSA

53.3 sw SUIT SELECT (two) → OFF

√SUIT SELECT LEDs (four) – Off

53.4 sw MAIN POWER → OFF

√MAIN POWER LED – Off

DCM

53.5 SCU ←|→ DCM

53.6 Install DCM cover.

C-Lk wall

53.7 Insert SCU in stowage pouch.

SUIT DRYING/SEAL WIPE (10 MINUTES)

☐☐☐☐ 54. Wipe with drying towel:

LTA, legs, boots

HUT, suit arms

Gloves

WARNING

Avoid stericide contact with eyes. Wash hands thoroughly after application.

☐☐☐☐ 55. Wipe LTA crotch with stericide (in EMU Servicing Kit).

☐☐☐☐ 56. Lightly wipe seals on LTA waist ring, arm wrist rings, HUT neck ring, helmet interior with lint-free wipe (in EMU Servicing Kit).

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- ☐☐☐☐ 57. Install Multiple Water Connector cover.
- ☐☐☐☐ 58. Clean, refurbish biomed.
- ☐☐☐☐ 59. Remove drink bags from EMU.
Dispose in shuttle wet trash (if available).

√Drink bag restraint bag installed in HUT

- ☐☐☐☐ 60. Remove helmet light batteries; stow
- ☐☐☐☐ 61. Clean PHA Quick Don Masks with dry wipes from EMU Servicing Kit.

EMU OVERNIGHT STOW (10 MINUTES)

NOTE

When shuttle present, minimum EMU hardware (helmet, HUT, LTA, LCVG, and battery only) should be located together to provide easy access for potential return to shuttle during an expedited undock.

- ☐☐☐☐ 62. Stow comm cap in right arm of EMU.
- ☐☐☐☐ 63. Helmet →|← HUT

Install helmet cover.
- ☐☐☐☐ 64. Tether LTA to EDDA.
- ☐☐☐☐ 65. Hang LCVGs, TCUs, other EMU accessories for drying.

NOTE

Do not perform step 66 if Metox regeneration is in progress.

MCC-H/IV
PCS

66. CONFIGURING AIRLOCK CCAA

Airlock: ECLSS: AL1A1 CCAA: CCAA Commands

AL CCAA Commands

'Temperature'

input Temperature Setpoint – 2 5 deg C

cmd Set

√Command Status – Temp Setpoint Complete

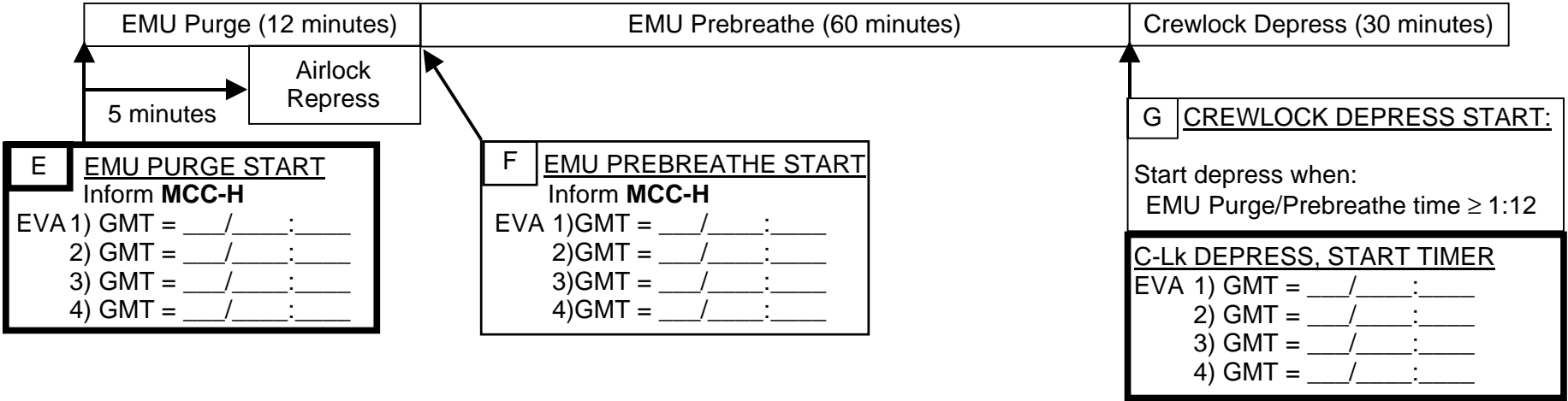
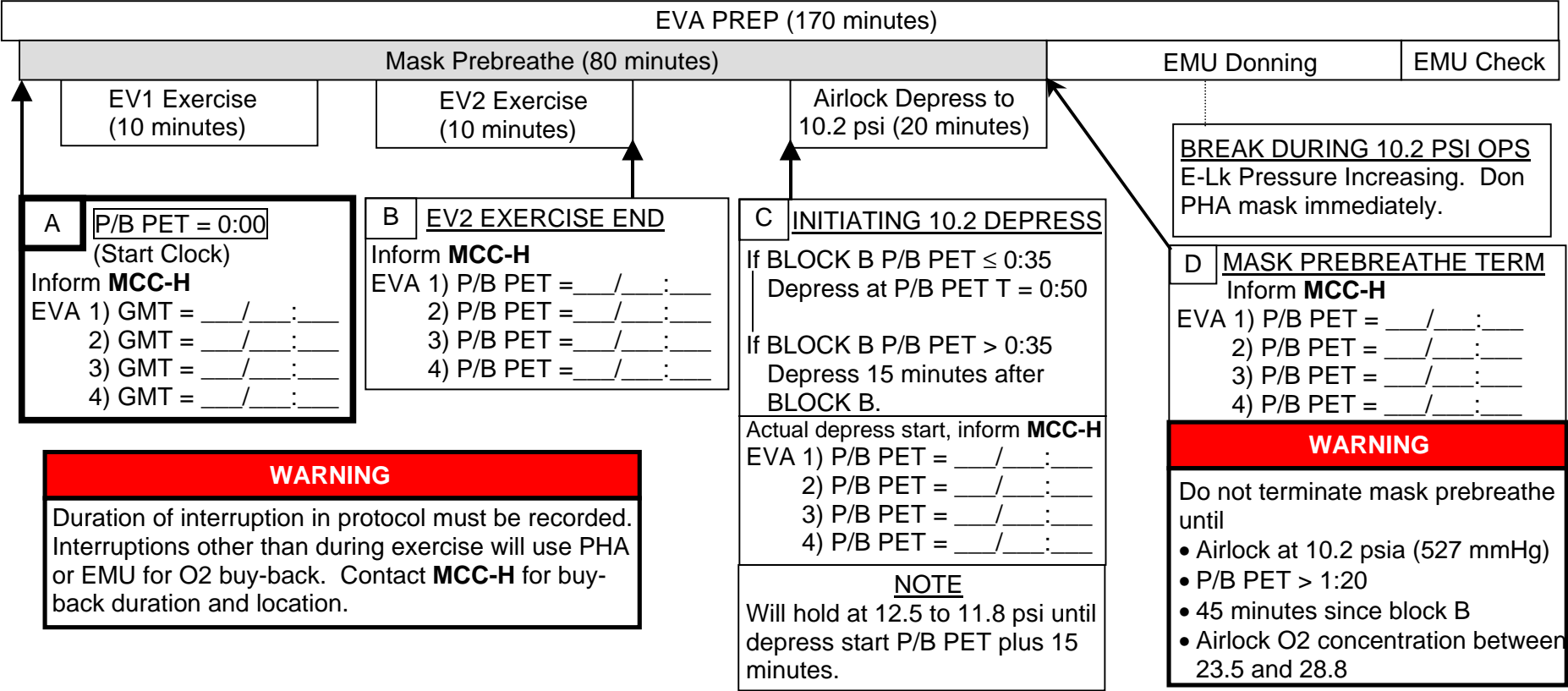
HOOK
VELCRO

EVA PREBREATHE CUE CARD

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ISS EVA-2a/ALL/E

EVA PREBREATHE EVENTS



HOOK
VELCRO

EVA PREBREATHE CUE CARD

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ISS EVA-2b/ALL/E

EVA EXERCISE PRESCRIPTION

Start Exercise Protocol	When Exercise Complete
<u>DON EXERCISE EQUIPMENT:</u> <ol style="list-style-type: none">1. Don Heart Rate Monitor chest strap and synchronize start of exercise with Heart Rate Watch and CEVIS Refer to {CEVIS ON LINE MODE OPERATIONS}, steps 2 and 4.2 to 4.4 (SODF: MED OPS: NOMINAL: CM), then:2. Configure bungees on CEVIS. <u>IF USING SHUTTLE O2, RECONFIGURE PHA TO 90 FT HOSE:</u> <ol style="list-style-type: none">3. 90-ft hose from shuttle LEH Port→ ← Special Tee Assembly4. 60-ft hose from PBA port ← → Special Tee Assembly5. Temporarily stow 60-ft hose for use after CEVIS ops. <u>INITIATE EXERCISE</u> <ol style="list-style-type: none">6. Perform exercise per prescription below. Synchronize start of Heart Rate Watch with exercise.	<u>TERMINATE EXERCISE</u> <ol style="list-style-type: none">7. Press STOP on CEVIS display and stop heart rate watch.8. Record Exercise End PET (For EV2 record in Block B of Prebreathe Events).9. Momentarily pull mask away from face to verify positive O2 flow. If no O2 flow, contact MCC-H.10. If all EV crew have completed exercise<ul style="list-style-type: none">Cycle ergometer Power Switch → OFFRemove PCMCIA card from CEVIS.Temporarily stow PCMCIA card. <u>DOFF EXERCISE EQUIPMENT</u> <ol style="list-style-type: none">11. Doff Heart Rate Monitor chest strap. Clean with alcohol wipes (EMU Servicing Kit) avoiding electrodes.12. Doff Ergometer/CEVIS shoes <u>IF USING SHUTTLE O2, RECONFIGURE PHA TO 60 FT HOSE</u> <div>When 5 minutes have elapsed after exercise completion</div> <ol style="list-style-type: none">13. 60-ft hose from PBA port → ← Special Tee Assembly14. 90-ft hose from Shuttle LEH Port ← → Special Tee Assembly

INITIATE EXERCISE

6. Perform exercise per prescription below.
Synchronize start of Heart Rate Watch with exercise.

NOTE
1. Maintain > 60 rpm and match arm/leg cadence (pedaling effort at < 60 rpm becomes noticeably more difficult). Use table values for workload and record heart rate. If heart rate exceeds the maximum indicated at the top of the table, decrease workload by 25-watt increments until heart rate falls below the maximum.
2. CEVIS timer will not increase while arrows remain displayed. Workload will change as soon as arrows are pressed.
3. If an interruption of either exercise or mask prebreathe < 2 minutes occurs during the 10-minute exercise, extend the 75 % max VO2 portion of the table for a duration equal to the interruption.

EXERCISE PRESCRIPTION		EV 1				EV 2				EV 3				EV 4			
		Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)			Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)			Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)			Workload (watts)	Heart Rate (bpm) (Not to exceed = ____)		
			EVA#1	EVA#2	EVA#3		EVA#1	EVA#2	EVA#3		EVA#1	EVA#2	EVA#3		EVA#1	EVA#2	EVA#3
1 min	37.5 %																
1 min	50 %																
1 min	62.5 %																
7 min	75 %																
1 min	Cooldown																
Exercise End PET			:	:	:		:	:	:		:	:	:		:	:	:

AIRLOCK CONFIG

	<u>GND</u>	<u>ISS</u>
1.305 EQUIPMENT LOCK PREP	71	71
1.307 REBA INSTALLATION/REMOVAL	77	77
1.310 SAFER STOW	79	MPV
1.315 AIRLOCK PREP FOR EVA OPS	81	MPV
1.330 LTA RESTRAINT INSTALLATION/REMOVAL	83	MPV
1.335 SAFER ON-BOARD TRAINING	85	85
1.340 PHA RECONFIG FOR SHUTTLE O2	89	MPV
1.345 PHA RECONFIG TO USE STATION O2	91	MPV
1.350 AIRLOCK DECONFIG POST EVA	93	MPV

AIRLOCK CONFIG

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1.305 EQUIPMENT LOCK PREP

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I

(45 Minutes)

OBJECTIVE:

Prepare Equipment Lock, EMUs, and ancillary hardware to support EVA Prep activities.

DRINK BAG FILL (15 MINUTES)

NOTE

1. Drink bag filling and degassing may take longer than 15 minutes.
2. Drink bag should not be filled over 32 oz. and is only certified to hold noniodinated water for a maximum of 24 hours.

BOTH

1. Fill drink bag (DIDB) from SM or shuttle galley using angled fill tool.
Remove gas from drink bag.
2. Stow fill tool in trash.
3. Temporarily stow drink bag in EMU Equipment Bag.

PREPARING EMU AND BIOMED EQUIPMENT (15 MINUTES)

If loose equipment is stowed in HUT

4. Waist ring ←|→ HUT
5. Remove loose equipment from HUT.
6. Waist ring →|← HUT
7. Stage crew preference items in EMU Equipment Bag as required.
8. Helmet ←|→ HUT
9. Unstow Comm Cap and inspect MBEDs (two) for damage.
Replace MBEDs as required (EMU Servicing Kit).
10. Remove DIDB restraint bag from HUT.
11. Insert drink bag into restraint bag.
Install restraint bag in HUT.
12. Install fresnel lenses, valsava devices, as required.
13. Apply antifog (EMU Servicing Kit) to the following:
Helmet (not Fresnel lens)
EV Glasses
Thoroughly wipe off antifog.
14. Helmet →|← HUT

1.305 EQUIPMENT LOCK PREP

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15. ✓Helmet lights installed on helmet

BSA 16. ✓CHARGE IN PROGRESS LED – Off

Unstow four helmet light batteries.
Install batteries in helmet lights.

17. ✓Helmet light ops

18. ✓EMU TV installed on helmet as required

If required

19. Unstow biomed sternal harness and signal conditioner from EMU Servicing Kit.

20. Install sternal harness in LCVG.

21. Install signal conditioner in LCVG pocket.

22. Sternal harness →|←signal conditioner

23. Reposition EDDA for EMU donning as required.

24. Cuff Checklist →|← EMU

PREPARING PREBREATHE EQUIPMENT (10 MINUTES)

If using Exercise Prebreathe Protocol

EV1, EV2

25. ✓CEVIS configuration in Node/Lab

26. Install prime and backup tubing (blue or black only) on CEVIS.

27. Unstow PCMCIA cards (two), Heart Rate Monitor, and Velcro straps.

E-Lk

Stow PCMCIA cards (two) and Heart Rate Monitor in side pocket of PHA Bag.

28. ✓PHA configuration per Figure 1 or Figure 2 as required

1.305 EQUIPMENT LOCK PREP

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Figure 1.- Prebreathe Hose Assembly (PHA) ISS O2 Use Configuration.

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Figure 2.- Prebreathe Hose Assemblies (PHA) Shuttle O2 Use Configuration.

29. Visually inspect three PHAs, PHA Quick Don Masks for any damage.
- BOTH 30. Stow Quick Don Masks and 15 feet of hose in large side pocket of PHA Bags.
- A/L10A1 31. ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

1.305 EQUIPMENT LOCK PREP

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VERIFYING EQUIPMENT IN AIRLOCK (5 MINUTES)

32. Confirm the following equipment is located in the Airlock:

- ☐☐☐☐ PFE located in PFE locker
 - √Pressure gauge needle in green zone (800 to 900 psig)
 - ☐☐☐☐ PBA Quick Don Masks and bottles for every isolated crewmember
 - √PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in the airlock
 - √Oxygen bottle pressure \geq 3000 psig for each bottle
 - ☐☐☐☐ CSA-CPs (two for exercise prebreathe and overnight campout)
 - √Good battery power on both CSA-CPs
 - ☐☐☐☐ Two spare regenerated METOX canisters
- All required EMU components:
- ☐☐☐☐ HUTS
 - ☐☐☐☐ LTAs
 - ☐☐☐☐ Gloves
 - ☐☐☐☐ Helmets
 - ☐☐☐☐ LCVGs (with biomed)
 - ☐☐☐☐ Comm Caps
 - ☐☐☐☐ Crew preference items
- ☐☐☐☐ Dosimeter
 - ☐☐☐☐ EMU Servicing Kit
 - ☐☐☐☐ Flashlight
 - ☐☐☐☐ Jeweler's Screwdriver (optional)
 - ☐☐☐☐ Airlock Tool kit
 - ☐☐☐☐ Earplugs
 - ☐☐☐☐ Towel
 - ☐☐☐☐ Aspirin

1.305 EQUIPMENT LOCK PREP

(ISS EVA SYS/7A - ALL/FIN 5/HC/PAPER ON ISS) Page 6 of 6 pages

WARNING

EV crewmembers should minimize application of hygiene and hydrocarbon-based products prior to EVA day to avoid introduction of irritants and combustibles into the EMU. For acceptable items in EMU, refer to {5.110 APPROVED NON-EMU HARDWARE MATRIX}, all (SODF: ISS EVA SYS: REFERENCE), as required.

- ☐☐☐☐ Personal Hygiene Items
- ☐☐☐☐ Egg Timers
- ☐☐☐☐ Vacuum Manometer (optional, √**MCC- M** for VM number)

1.307 REBA INSTALLATION/REMOVAL

(ISS EVA SYS/7A - ALL/FIN 4) Page 1 of 2 pages

I

(10 Minutes for Installation)
(10 Minutes for Removal)

OBJECTIVE:

Install/remove Rechargeable EVA Battery Assembly (REBA) to/from the back of EMU PLSS.

NOTE

1. Take care when mating/demating EMU Power Harness to avoid damaging pins.
2. Refer to figures below for procedure.

INSTALLATION (10 MINUTES)

1. Unstow REBA, note barcode (serial number).
2. As required, rotate EDDA to access back of EMU.
3. Unzip TMG to access REBA pouch and EMU Power Harness.
4. Remove REBA J1 fabric cover.
5. Install REBA on EMU.
6. Configure REBA pull tabs through slots in TMG.
7. √sw (pulltab) REBA – OFF, toward left arm of suit
8. EMU Power Harness (P1) →|← REBA (J1)
9. Report REBA barcode (serial number) to **MCC-H** as comm permits.
10. Zip TMG closed.
11. Rotate EDDA closed as required.

REMOVAL (10 MINUTES)

12. As required, rotate EDDA to access back of EMU.
13. √sw (pulltab) REBA – OFF
14. EMU Power Harness (P1) ←|→ REBA (J1)
15. Remove REBA from EMU.
16. Install REBA J1 fabric cover.
17. Report REBA barcode (serial number) to **MCC-H** as comm permits.
Stow REBA.
18. Rotate EDDA closed as required.

1.307 REBA INSTALLATION/REMOVAL

(ISS EVA SYS/7A - ALL/FIN 4) Page 2 of 2 pages

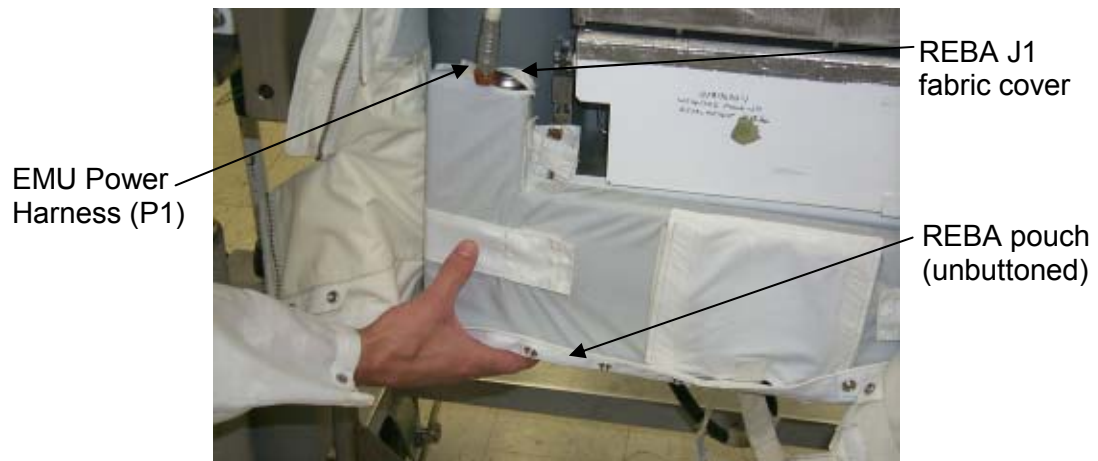


Figure 1.- REBA Installation on PLSS.



Figure 2.- REBA Pulltabs Routed Through TMG Slot.

1.310 SAFER STOW

(ISS EVA SYS/7A - ALL/FIN 4) Page 1 of 1 page

I

(10 Minutes)

OBJECTIVE:

Stow one or more SAFER in preparation for long-term stowage on ISS or entry on shuttle.

Prop. Module	<ol style="list-style-type: none">1. ✓Inhibitor installed2. ✓Thruster towers folded3. Unstow Stowage Straps from EMU Equipment Bag.4. Install Stowage Straps.5. ✓MAN ISOL vlv – CL (up)
C-Lk	<p>If stowed SAFER stays on-orbit</p> <ol style="list-style-type: none">6. Stow SAFER in on-orbit SAFER Stowage Bag.7. Attach SAFER Stowage Bag to handrails. <p>If stowed SAFER is to be returned to ground</p> <ol style="list-style-type: none">8. Deploy HCM.9. Install power switch guard.10. Restow HCM tray (HCM remains unstowed)11. Route HCM cable through notch in corner of door. Close HCM door.
Shuttle	<ol style="list-style-type: none">12. Stow SAFER and HCM in foam cut-outs of Airlock Floor Bag (or other specified landing bag).

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1.315 AIRLOCK PREP FOR EVA OPS

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

Prepare Joint Airlock and EMUs to support EVA operations. Verify Airlock hardware and EMUs are powered off and in a nominal configuration.

- A/L 1. Remove non-EVA related bags/items stowed in Airlock.
- E-Lk 2. √SSC, PCS installed in E-Lk
- UIA 3. √sw PWR EV-1,2 (two) – OFF
 √PWR EV-1,2 LEDs (four) – Off
 √WATER SUPPLY EV-1,2 vlv (two) – CLOSE
 √WATER REG EV-1,2 vlv (two) – SUPPLY
 √OXYGEN EMU1,2 vlv (two) – CLOSE
 √OXYGEN ORLAN vlv – CLOSE
 √OSCA – O2 CLOSED (3AKP)
 √sw DEPRESS PUMP PWR – OFF
 √DEPRESS PUMP ENABLE LED – Off
- C-Lk 4. √DEPRESS/REPRESS Cue Card installed in C-Lk
5. √EV Hatch MPEV – CLOSED
6. √DEPRESS PUMP MAN ISOV – CLOSED
- BCA 7. √sw MAIN POWER (four) – OFF
 √MAIN POWER LEDs (four) – Off
- PSA 8. √sw MAIN POWER – OFF
 √MAIN POWER LED – Off
 √sw SUIT SELECT (two) – OFF
 √SUIT SELECT LEDs (four) – Off
 √sw EMU MODE EMU1,2 (two) – PWR
 √sw IRU/UTILITY POWER – OFF
- IRU 9. √sw POWER – OFF
 √POWER LED – Off
 √sw PUMP – OFF
 √PUMP LED – Off
 √H2O OUTLET vlv (rotary) – CLOSED
- Metox 10. √sw POWER – OFF
Regen √ON LED – Off
 √sw MODE – REGENERATE
 √sw FAULT OVERRIDE – OFF

1.315 AIRLOCK PREP FOR EVA OPS

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 2 pages

- DCM 11. √sw POWER – SCU
 √sw FAN – OFF
 √O2 ACT – OFF
 √sw WATER – OFF
 √Water switch guard installed
 √sw COMM mode – OFF
 √sw Comm FREQ – LOW
 √PURGE vlv – op (up)
 √Helmet purge vlv – cl, locked
- A/L1O1 12. Unstow from M0-2 Bag:
 EMU Equipment Bag (as required)
 EMU Servicing Kit
 Attach EMU Equipment Bag to A/L1A1 (as required).
- EMU1,2 13. √Helmet lights installed on EMUs
 √EMU TVs installed on helmet lights
14. Temporarily stow MWS, BRT as required.
15. Waist ring ←|→ HUT
16. Remove LCVG.
 Temporarily stow LCVG.
17. Waist ring →|← HUT

1.330 LTA RESTRAINT INSTALLATION/REMOVAL

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 2 pages

(15 Minutes for Installation)

(15 Minutes for Removal)

OBJECTIVE:

Installation of the LTA Restraint Strap and Bag on the EMU for bundling and transferring. Also removal of the LTA Restraint Strap and Bag for stowing the EMU unbundled on the EDDA.

NOTE

1. May be performed on EMU 1 and 2 simultaneously.
Perform steps as required for current EMU configuration.
2. Refer to Figure 1 for terminology.

INSTALLATION (15 MINUTES)

E-Lk

1. Unstow LTA Restraint Bag and LTA Restraint Strap.

√LTA Restraint Bag attached to LTA Restraint Strap D-rings (three)

2. Remove EMU from EDDA.
3. LTA Restraint Strap SAFER mount brackets (two) →|← SAFER striker plate on PLSS
4. Install elastic band of LTA Restraint Strap around SOP.
5. Tighten cinch strap mechanism.
6. Engage EMU in EDDA.
7. Stow LTA and suit arms inside LTA Restraint Bag.

NOTE

1. Strap French hooks should be attached to SAFER mount brackets for launch and landing, but may be used to attach the bundled EMU to structure while on-orbit.
2. For installation for landing, the upper spring hooks need to be attached to the AAP upper attachment ring in the shuttle Airlock (Middeck).

8. Upper spring hooks (two) →|← SAFER mount brackets (two) such that strap runs over shoulder
9. Lower spring hooks (two) →|← SAFER mount brackets (two)
10. Tighten all LTA Restraint Bag Straps with Bag as high as possible on EMU.

REMOVAL (15 MINUTES)

11. As required, remove comm cap from LTA Restraint Bag.
Temporarily stow comm cap in EMU Equipment Bag.

1.330 LTA RESTRAINT INSTALLATION/REMOVAL

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 2 pages

- E-Lk
12. All LTA restraint attachments ←|→ SAFER mount brackets (two)
 13. Loosen cinch strap mechanism.
 14. SAFER mount brackets ←|→ SAFER striker plate on EMU PLSS
 15. Remove LTA Restraint Strap from EMU PLSS.
Stow LTA Restraint Strap in LTA Restraint Bag pouch leaving D-rings (three) connected to Bag.
 16. Engage EMU in EDDA.
 17. Stow LTA Restraint Bag and LTA Restraint Strap.

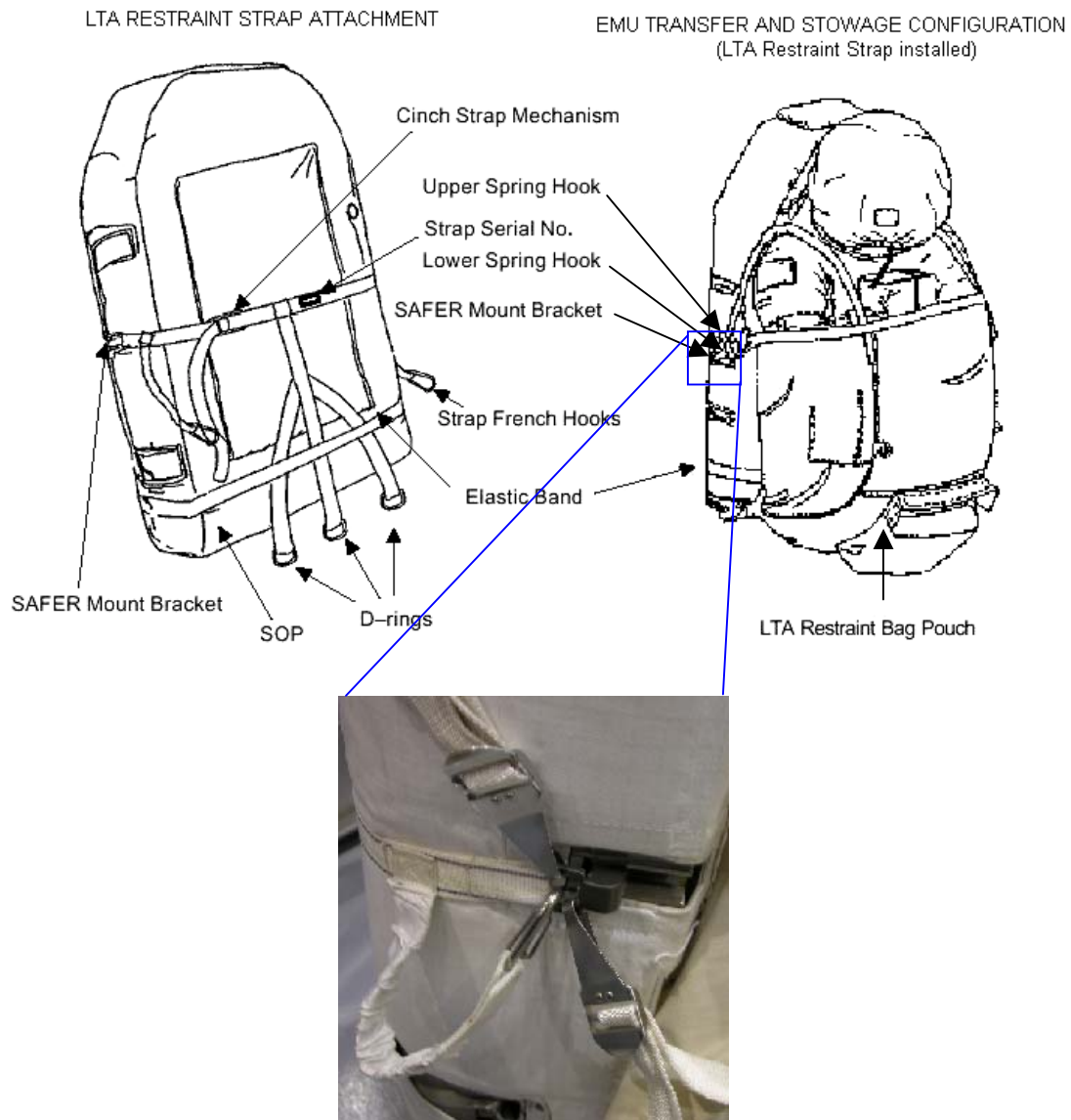


Figure 1.- LTA Restraint Bag and Strap Configuration

1.335 SAFER ON-BOARD TRAINING

(ISS EVA SYS/8A - ALL/FIN 3/PAPER ON ISS)

Page 1 of 4 pages

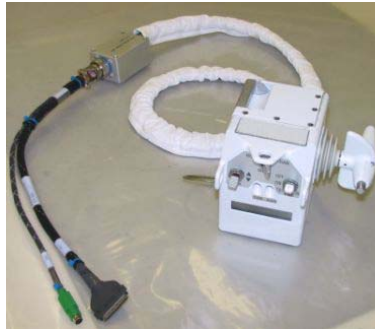
(30 Minutes for Setup)
(30 to 60 Minutes for Training)

OBJECTIVE:

Set up SAFER On-Board Trainer and practice SAFER checkout and rescue operations.

CAUTION

Due to PCMCIA card touch temp concerns, do not use trainer at 527 mmHg (10.2 psia).



HARDWARE UNSTOW

1. Unstow the following:

ITEM	QTY	P/N (S/N)	Location
Ethernet Terminators	2	SED39129319-801	NOD1S4_B2
Ethernet T-connectors	2	SED39129318-801	NOD1S4_B2
3COM PCMCIA Etherlink Network PC Cards with Dongles	2	SDZ39129269-301	Various
Ethernet 10base2 Cable 3 feet (coax)	1	SED39129316-301	Various
SAFER Simulation (Quickflex) PCMCIA card	1	QQ1-030A064V4	CD Library, Vol 1A
SAFER training hand controller (HCM) with Adapter cable	1	SEG33114457-301	AL1D1 CTB 1172
Windows SSC (graphics PC)	1		Various
Linux SSC with RedHat (ROBOT/SAFER) hard drive (sim PC)	1	SDZ39129266-301 (6057)	Hard drive in CD Library, Vol 1A

* If no SSC configured as a Sim PC
* Perform {2.403 THINKPAD HARD DRIVE CHANGEOUT}
* (SODF: POC: NOMINAL) inserting ROBOT/SAFER hard drive
* into sim PC, then:

1.335 SAFER ON-BOARD TRAINING

(ISS EVA SYS/8A - ALL/FIN 3/PAPER ON ISS)

Page 2 of 4 pages

2. ✓ 3COM PCMCIA Etherlink Network PC cards installed in both SSCs in bottom slot

SSC CONFIGURATION

NOTE

For proper network connectivity, SSC CONFIGURATION must be complete prior to powering up SSCs.

3. Configure SSCs as illustrated in Figure 1.

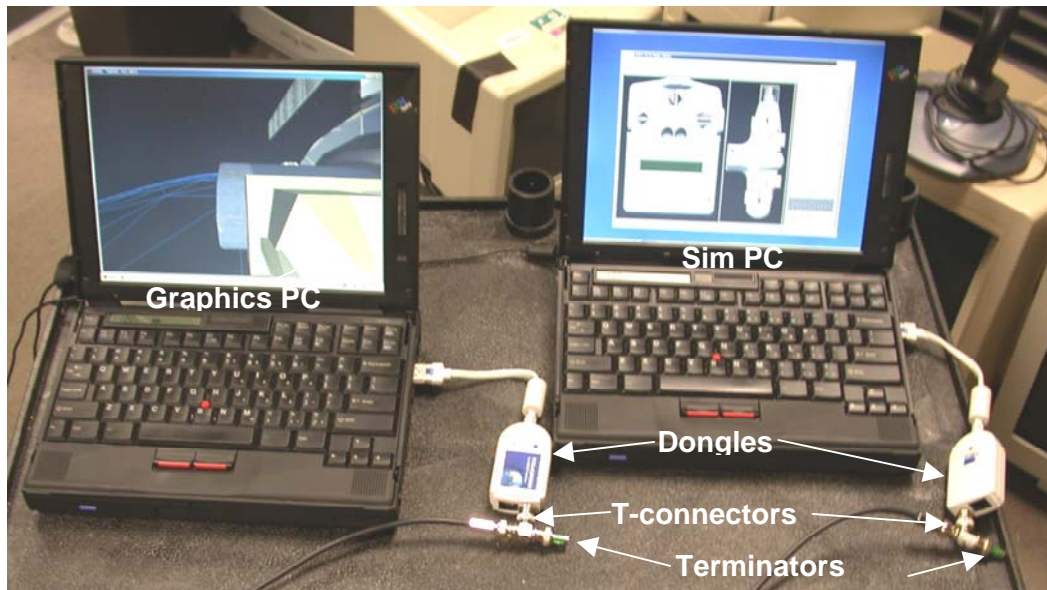


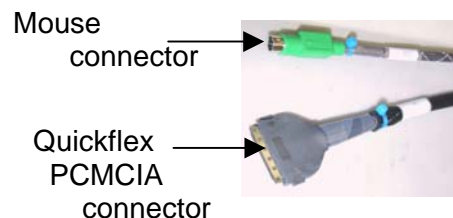
Figure 1.- SSC Configuration.

HCM CONNECTION

- Sim PC 4. Insert SAFER Simulation (Quickflex) PCMCIA card.

5. ✓ Adapter Cable →|← HCM

6. SAFER training hand controller →|← Quickflex PCMCIA card and mouse port



DOUG STARTUP

7. Power up SSCs, if required.

1.335 SAFER ON-BOARD TRAINING

(ISS EVA SYS/8A - ALL/FIN 3/PAPER ON ISS) Page 3 of 4 pages

Graphics PC 8. From desktop, sel Station Apps folder icon.

9. sel DOUG application icon (Doug.exe)

10. SELECTING VISUAL LOAD

Load Select Dialog

sel desired flight load
sel OK

11. SELECTING DISPLAY CONTENT

Select Display Dlg

sel SAFER
sel OK

While DOUG is loading

12. Verify dongle LED (green) – Blinking

When Graphics PC loading complete

Sim PC 13. Log in using SAFER user name and password listed on desktop banner.

14. Verify dongle LED (green) – On, (indicates high network activity)

SELF-RESCUE SIMULATION

15. sel desired scenario
sel separation rate
sel Day or Night

NOTE

1. Only SIM PC SAFER power switch is functional.
2. Any input on the HCM except for power switch throws will make it the active controller for the rest of the run.

HCM 16. √sw MODE – ROT

17. √sw PWR – OFF

SIM PC 18. sel START

When 30 second countdown complete

19. PWR → ON

When rescue complete

20. sel STOP

21. Repeat steps 15 to 20 as required for more training.

1.335 SAFER ON-BOARD TRAINING

(ISS EVA SYS/8A - ALL/FIN 3/PAPER ON ISS)

Page 4 of 4 pages

SAFER CHECKOUT PRACTICE

Sim PC 22. ✓PWR – OFF

23. sel START

24. PWR → TST/ON

PWR → ON

PWR → TST/ON

25. Follow instructions displayed on SIM PC SAFER display.

26. PWR → OFF

HARDWARE STOW

When SAFER training complete

27. HCM ←|→ Sim PC (if applicable)

AL1D1

Stow HCM in CTB 1172 (keep adapter cable attached).

28. Power down SSCs.

29. Remove PCMCIA cards and stow network hardware.

30. Go to {2.403 THINKPAD HARD DRIVE CHANGEOUT}
(SODF: POC: NOMINAL) to remove ROBOT/SAFER hard drive from
sim PC.

1.340 PHA RECONFIG FOR SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 2)

Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

Configure three PHA Bags from the Airlock to form two 60-ft PHAs and one 90-ft PHA in support of procedure 1.210 EVA Prep Using Shuttle O2.

1. INSPECTING PHA

A/L

1.1 Unstow all three PHA Bags.

All PHAs

1.2 Verify each length of the Hose does not have any obvious physical damage, deterioration, abrasions, flattening, kinking, or fraying.

1.3 Verify QD mating areas are free of debris, cracking, fraying, or deterioration.

1.4 Verify Quick Don Mask pressure harness, visor, silicon face seal do not have any obvious physical damage, deterioration, tears, debris, scratches, fraying, or cracking.

1.5 Verify the length of Hose from Mask to Oxygen Extension Hose does not have any obvious physical damage, deterioration, cuts, flattening, kinking, or cracking around the mating area of the hose.

1.6 Verify microphone module, microphone, communication cable, and earphone cable assemblies are secure and free of damage.

1.7 If required, clean Quick Don Mask visor using Dry Wipes.

2. CONFIGURING 90-FT HOSE FOR LEH PORT

2.1 Configure 90-ft PHA Bag as shown in Figure 1.

2.2 Use tape to label PHA Bag as 90-ft PHA Bag.

2.3 ✓Tethered QD locks (four) engaged

3 x 30 feet of Hose

Relief Valve
SDG33112233-303



Figure 1.- 90-ft PHA Bag Configuration.

1.340 PHA RECONFIG FOR SHUTTLE O2

(ISS EVA SYS/UF2 - ALL/FIN 2)

Page 2 of 2 pages

3. CONFIGURING 60-FT HOSES FOR PBA PORT

NOTE

The male end of one 60-ft PHA will not have the strain relief feature. There is no operational difference.

3.1 Configure 60-ft PHA Bags as shown in Figure 2.

3.2 Use tape to label PHA Bags as 60-ft PHA Bags.

2 x 30 feet of Hose in each Bag

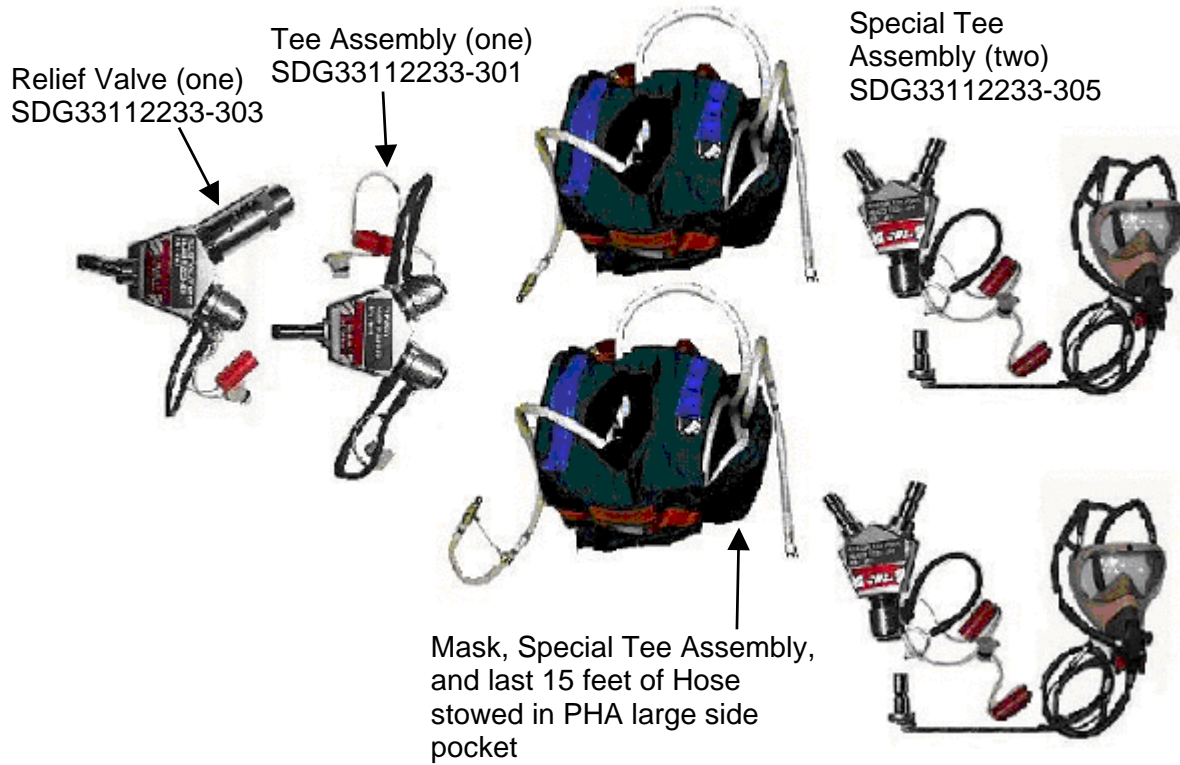


Figure 2.- 60-ft PHA Bag Configuration.

3.3 ✓ Tethered QD locks (nine) engaged

3.4 Verify all three PHA Bags contain a Relief Valve, a Tee Assembly, and a Special Tee Assembly with caps installed on open female QDs.

3.5 Stow remaining hardware in Ziplock Bag labeled Spare PHA Hardware.

- ☐ 2 x 30 feet of Hose (with caps installed on female QDs)
- ☐ Quick Don Mask

3.6 Stow PHA Bags in C-Lk.

1.345 PHA RECONFIG TO USE STATION O2

(ISS EVA SYS/UF2 - ALL/FIN 2) Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

Configure PHA Bags from the Airlock to form two 120-ft PHAs in support of procedures 1.215 EVA Prep Using ISS O2 and 2.320 10.2 psia Campout EVA Prep.

1. INSPECTING PHA

A/L

- 1.1 Unstow 90-ft PHA Bag, and both 60-ft PHA Bags.
Unstow PHA Spare Hardware Ziplock Bag.

All PHAs

- 1.2 Verify each length of the Hose does not have any obvious physical damage, deterioration, abrasions, flattening, kinking, or fraying.
- 1.3 Verify QD mating areas are free of debris, cracking, fraying, or deterioration.
- 1.4 Verify Quick Don Mask pressure harness, visor, silicon face seal do not have any obvious physical damage, deterioration, tears, debris, scratches, fraying, or cracking.
- 1.5 Verify the length of Hose from Mask to Oxygen Extension Hose does not have any obvious physical damage, deterioration, cuts, flattening, kinking, or cracking around the mating area of the hose.
- 1.6 Verify microphone module, microphone, communication cable, and earphone cable assemblies are secure and free of damage.
- 1.7 If required, clean Quick Don Mask visor using Dry Wipes.

2. CONFIGURING 120-FT HOSES

- 2.1 Configure two 120-ft PHA Bags as shown in Figure 1.



Figure 1.- 120-ft PHA Bag Configuration.

1.345 PHA RECONFIG TO USE STATION O2

(ISS EVA SYS/UF2 - ALL/FIN 2) Page 2 of 2 pages

2.2 ✓ Tethered QD locks (five per Bag) engaged

3. CONFIGURING SPARE PHA BAG

3.1 Configure spare PHA Bag as shown in Figure 2.

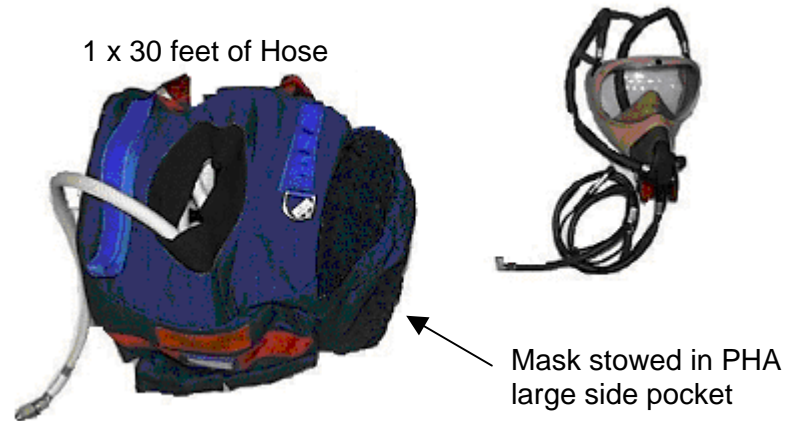


Figure 2.- Spare PHA Bag Configuration.

3.2 Verify all three PHA Bags contain a Relief Valve, a Tee Assembly, and a Special Tee Assembly with caps installed on open female QDs.

3.3 Verify caps installed on open female QDs of Hoses.

3.4 Remove 90-ft PHA Bag and 60-ft PHA Bag tape labels from Bags.

3.5 Stow all PHA hardware and report completion status to **MCC-H**.

1.350 AIRLOCK DECONFIG POST EVA

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

Deconfigure Airlock following EVA operations and prepare EMUs and equipment for long-term stowage.

1. Stow LCVG in HUT (leave LCVG disconnected from Multiple Water Connector).
- EMU1,2 2. Waist ring →|← HUT
3. √Helmet →|← HUT
√Helmet purge vlv – cl, locked
√Sun visor (gold) – up
√Sun shades (three, white) – down
√Helmet cover installed
4. MWS →|← HUT as required
5. BRT →|← HUT as required
- DCM 6. √sw POWER – SCU
√sw FAN – OFF
√O2 ACT – OFF
√sw WATER – OFF
√Water switch guard installed
√sw COMM mode – OFF
√sw Comm FREQ – LOW
√PURGE vlv – op (up)
- E-Lk If EMU Equipment Bag desired to be stowed
7. EMU Equipment Bag ←|→ panel A/L1A
Stow EMU Equipment Bag in M0-2 (EVA Prep and Ops) Bag.
8. Stow EMU Servicing Kit in M0-2 Bag.
- EMU1,2 9. √Helmet lights installed on EMUs
√EMU TVs installed on helmet lights
- A/L1D2 10. √PHA ←|→ PHA port
- PHA 11. Clean Quick Don Mask.
12. Stow PHA Quick Don Mask in PHA side pocket.
Stow hose in PHA Bag.
- C-Lk 13. Strap PHA Bag to handrail directly above UIA.

1.350 AIRLOCK DECONFIG POST EVA

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 2 of 2 pages

- UIA 14. √sw PWR EV-1,2 (two) – OFF
 √PWR EV-1,2 LEDs (four) – Off
 √WATER SUPPLY EV-1,2 vlv (two) – CLOSE
 √WATER REG EV-1,2 vlv (two) – SUPPLY
 √OXYGEN EMU1,2 vlv (two) – CLOSE
 √OXYGEN ORLAN vlv – CLOSE
 √OSCA – O2 CLOSED (3AKP)
 √sw DEPRESS PUMP PWR – OFF
 √DEPRESS PUMP ENABLE LED – Off
- C-Lk 15. √EV Hatch MPEV – CLOSED
 √DEPRESS PUMP MAN ISOV – CLOSED
- BCA 16. √sw MAIN POWER (four) – OFF
 √MAIN POWER LEDs (four) – Off
- PSA 17. √sw MAIN POWER – OFF
 √MAIN POWER LED – Off
 √sw SUIT SELECT (two) – OFF
 √SUIT SELECT LEDs (four) – Off
 √sw EMU MODE EMU1,2 (two) – PWR
 √sw IRU/UTILITY POWER – OFF
 √IRU/UTILITY POWER LED – Off
- IRU 18. √sw POWER – OFF
 √POWER LED – Off
 √sw PUMP – OFF
 √PUMP LED – Off
 √H2O OUTLET vlv (rotary) – CLOSED
- Metox
Regen 19. √sw POWER – OFF
 √ON LED – Off
 √sw MODE – REGENERATE
 √sw FAULT OVERRIDE – OFF

CHECKOUTS

	<u>GND</u>	<u>ISS</u>
1.402 EMU TO AIRLOCK INTERFACE CHECK	97	97
1.403 REBA POWERED HARDWARE CHECKOUT	103	103
1.405 EMU CHECKOUT	105	MPV
1.406 EMU CHECKOUT RESULTS	113	113
1.410 EMU MIDTERM CHECKOUT	115	MPV
1.411 EMU MIDTERM CHECKOUT RESULTS TABLE	139	139
1.415 EMU CHECKOUT ON BATTERY POWER	141	MPV
1.416 EMU CHECKOUT ON BATTERY POWER RESULTS	151	151
1.420 EMU SERIAL DATA RECORDING	153	MPV
1.430 SAFER CHECKOUT	161	MPV
1.445 PSA ACTIVATION AND CHECKOUT	165	MPV

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1.402 EMU TO AIRLOCK INTERFACE CHECK

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS) Page 1 of 5 pages

I

(30 Minutes)

OBJECTIVE:

Verify EMU is compatible with the Airlock interfaces prior to an EVA. This is to be done when an EMU is launched on shuttle, but will egress from ISS Airlock. Necessary only prior to the first EVA for that EMU from the Joint Airlock.

NOTE

1. Procedures are written for simultaneous powerup of two EMUs.
2. '**PWR RESTART**' message occurs and BITE light is illuminated whenever EMU power is cycled.
3. Step 1 not required to initiate procedure but is required to be completed prior to step 27.

MCC-H/IV

1. CONFIGURING UHF COMM

1.1 Powering up UHF 1 for EVA Operations on 414.2 MHz

Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16 (SODF: C&T: NOMINAL: UHF), then:

1.2 Configuring Audio Subsystem for EVA Operations

Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then:

PCS

EMU POWER VERIFICATION

UIA

2. $\sqrt{\text{sw}}$ PWR EV-1,2 (two) – OFF

$\sqrt{\text{PWR EV-1,2 LEDs (four) – Off}}$

$\sqrt{\text{EMU O2 SUPPLY PRESS gauge: 850 to 950}}$

E-Lk

3. Hang EMU Equipment Bag above EDDA on Aft Rack.

C-Lk wall

4. Remove SCUs from stowage straps and pouches. Transfer SCU to E-Lk.

DCM

☐☐☐

5. Remove DCM covers. Affix covers with Velcro to DCM.

☐☐☐

6. SCU \rightarrow | \leftarrow DCM

$\sqrt{\text{SCU locked}}$

☐☐☐

7. Helmet \leftarrow | \rightarrow HUT

Temporarily stow helmet.

1.402 EMU TO AIRLOCK INTERFACE CHECK

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS) Page 2 of 5 pages

☐☐☐ 8. $\sqrt{\text{Comm Cap}} \rightarrow | \leftarrow$ Electrical Harness

PLSS ☐☐☐ 9. $\sqrt{\text{Metox Canister installed}}$
 $\sqrt{\text{Battery installed}}$

DCM ☐☐☐ 10. sw POWER \rightarrow BATT

CAUTION

EMU must be on BATT power when UIA suit power is turned on.

PSA ☐☐☐ 11. $\sqrt{\text{sw SUIT SELECT (two) - OFF}}$
 $\sqrt{\text{sw EMU MODE EMU1,2 (two) - PWR}}$

☐☐☐ 12. sw MAIN POWER \rightarrow ON
 $\sqrt{\text{MAIN POWER LED - On}}$

☐☐☐ 13. sw SUIT SELECT (two) \rightarrow EMU 1,2
 $\sqrt{\text{EMU 1,2 LEDs (two) - On}}$
 $\sqrt{\text{EMU 1,2 Volts: 18.0 to 19.0}}$

UIA ☐☐☐ 14. sw PWR EV-1,2 (two) \rightarrow ON
 $\sqrt{\text{PWR EV-1,2 EMU LEDs (two) - On}}$

DCM ☐☐☐ 15. sw POWER \rightarrow SCU

☐☐☐ 16. $\sqrt{\text{STATUS: H2O TEMP}} = \text{ambient}$

EMU	1	2	3
16. H2O TEMP			

☐☐☐ 17. Waist Ring $\leftarrow | \rightarrow$ HUT

Secure LTA.

☐☐☐ 18. Unstow the SCOF from the EMU Equipment Bag.

19. If wet LCVG is available
19.1 Remove Multiple Water Connector cover.
19.2 LCVG $\rightarrow | \leftarrow$ Multiple Water Connector

1.402 EMU TO AIRLOCK INTERFACE CHECK

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS) Page 3 of 5 pages

20. If wet LCVG not available

20.1 Unstow the Cooling Loop Jumper from EMU Equipment Bag.

20.2 Remove Multiple Water Connector cover.

20.3 Cooling Loop Jumper →|← Multiple Water Connector

DCM ☐☐☐ 21. Temp control vlv → MAX C

CAUTION

Minimize Fan operation with O2 ACT – OFF (~2 minutes).

☐☐☐ 22. sw FAN → ON

UIA ☐☐☐ 23. √PWR EV-1,2 AMPS: 1.5 to 6.5 [1.5 to 4.7 at 10.2 psia (527 mmHg)]

EMU	1	2	3
23. PWR EV-1,2 AMPS			

☐☐☐ 24. Install SCOF, lock.

DCM ☐☐☐ 25. O2 ACT → IV
NO VENT FLOW message
sw DISP → PRO

☐☐☐ 26. √STATUS: H2O TEMP decrease from step 16
√STATUS: RPM: 19.0 to 20.0 K

EMU	1	2	3
26. H2O TEMP			
RPM			

UIA ☐☐☐ 27. √PWR EV-1,2 AMPS: 1.5 to 4.0 [1.5 to 3.6 at 10.2 psia (527 mmHg)]
√PWR EV-1,2 AMPS decrease from step 22

EMU	1	2	3
27. PWR EV-1,2 AMPS			

1.402 EMU TO AIRLOCK INTERFACE CHECK

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS) Page 4 of 5 pages

RF COMM CHECK

NOTE

Step 1, Configuring UHF Comm, should nominally be completed by **MCC-H** prior to crew arriving at this point in the procedure.

EV/IV

28. ✓ **MCC-H** complete with step 1

Don comm cap and headset.

NOTE

The EMUs will be hot mic to **MCC-H** on public 1 once the COMM modes are taken out of hardline (HL) and the Comm FREQs are in LOW.

DCM

29. sw COMM mode → PRI

30. ✓ sw Comm FREQ – LOW

IV ATU 6

31. pb 1 → Press

✓ Display – ‘**1TG**’ and other loops, as required

✓ Display – ‘**PTT**’

EV1,2

32. Perform IV/EV comm check.

DCM

☐☐☐

33. sw COMM mode → OFF

34. Doff comm caps and headset.

MCC-H/IV

35. DECONFIGURING AUDIO SUBSYSTEM FROM EVA OPERATIONS

PCS

Contact **MCC-H** to perform {2.210 AUDIO SUBSYSTEM DECONFIGURATION FROM UHF OPS}, all (SODF: C&T: NOMINAL: AUDIO), then:

36. POWERING DOWN UHF 1 AFTER EVA OPERATIONS

Contact **MCC-H** to perform {2.702 UHF 1 ORU DEACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:

EMU RECONFIGURATION

DCM

☐☐☐

37. O2 ACT → OFF

☐☐☐

38. sw FAN → OFF
☐☐☐ O2 IS OFF message
sw DISP → PRO

1.402 EMU TO AIRLOCK INTERFACE CHECK

(ISS EVA SYS/7A - ALL/FIN 6/HC/Paper on ISS) Page 5 of 5 pages

- ☐☐☐ 39. Remove SCOF.
Stow SCOF in EMU Equipment Bag.
- UIA ☐☐☐ 40. sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off
- ☐☐☐ 41. √OXYGEN EMU 1,2 vlv (two) → CLOSE
- PSA 42. sw SUIT SELECT (two) → OFF

√SUIT SELECT LEDs (four) – Off
- PSA 43. sw MAIN POWER → OFF

√MAIN POWER LED – Off
- If LCVG not attached
| ☐☐☐ 44. Cooling Loop Jumper ←|→ MultipleWater
Connector

Stow Cooling Loop Jumper in EMU
Equipment Bag.
Install Multiple Water Connector cover.
- If LCVG attached
| ☐☐☐ 45. LCVG ←|→ MultipleWater Connector

Stow LCVG.
Install Multiple Water Connector cover.
- ☐☐☐ 46. If required, Comm Cap ←|→ Electrical Harness

Stow comm cap.
- ☐☐☐ 47. Install helmet, LTA.
- DCM ☐☐☐ 48. SCU ←|→ DCM
- ☐☐☐ 49. Install DCM cover.
- C-Lk
wall ☐☐☐ 50. Insert SCU in stowage pouch.

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(15 Minutes)

OBJECTIVE:

Verify the EMU glove heaters are functional and the EMU TV is receiving power from the Rechargeable EVA Battery Assembly (REBA) prior to EVA.

- EMUs 1. √REBA installed on PLSS
 √sw REBA (pulltab) – OFF

If EMU TV capability

2. Install EMU TV on helmet lights; note camera addresses and serial numbers.
Refer to Figure 1.
3. Record camera addresses and serial numbers for each EMU.

	Camera Addresses	Serial Numbers
EMU 1		
EMU 2		
EMU 3		
EMU 4		

4. Unstow EMU TV power cable.
5. EMU TV power cable ←|→ Ground Plug
6. EMU TV power cable →|← EMU TV

If no EMU TV capability

7. √EMU TV power cable →|← Ground Plug
8. √Upper arm connection, Lower Arm Power Harness →|← SEMU cable
9. √sw Glove heater (one per glove) – OFF
10. Lower Arm Power Harness →|← Gloves

NOTE

To avoid excessive battery consumption and heat buildup, deactivate heaters once heat detected at fingertips.

11. sw REBA (1 per EMU) → ON, pull tab toward right arm of suit
12. sw Glove heater (two per EMU) → ON

When heat detected on all outside fingertips

13. sw Glove heater (two per EMU) → OFF

1.403 REBA POWERED HARDWARE CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 2 of 2 pages

If EMU TV capability

14. pb EMU TV power → Press

√Green LED – On

15. pb EMU TV power → Press

√Green LED – Off

16. sw REBA (1 per EMU) → OFF, pull tab toward left arm of suit

17. Lower Arm Power Harness ←|→ Gloves

18. Stow lower arm and glove pwr harness connectors under TMG.

19. EMU TV Power Cable ←|→ EMU TV

20. EMU TV Power Cable →|← Ground Plug

21. Stow EMU TV Power Cable.

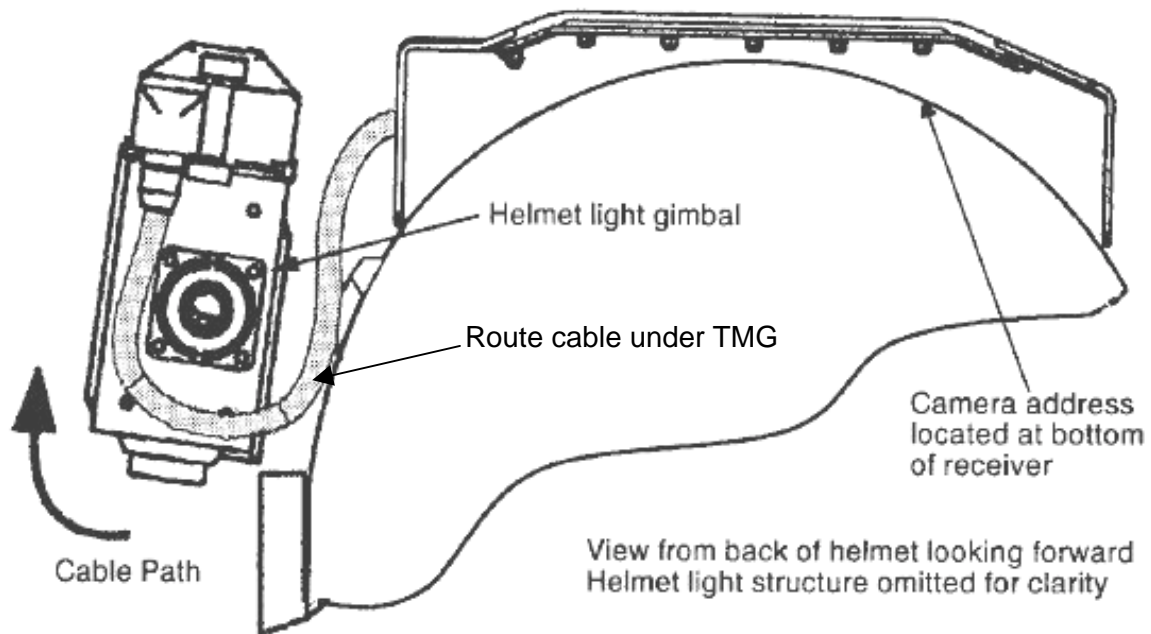


Figure 1.- REBA Connection for EMU TV.

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 1 of 8 pages

I

(100 minutes)

OBJECTIVE:

Verify all systems on the Extravehicular Mobility Unit (EMU) are functional prior to use.

NOTE

1. Procedure is written for simultaneous checkout of two EMUs.
2. **PWR RESTART** message occurs and BITE light is illuminated whenever EMU power is cycled.
3. Steps 1.1 and 1.2 should nominally be completed by **MCC-H** prior to the start of checkout but are not required for steps 2 through 8.10.
4. Record results of parameters on {1.406 EMU CHECKOUT RESULTS} Table (SODF: ISS EVA SYS: CHECKOUTS).

MCC-H/IV
PCS

1. CONFIGURING FOR EMU COMM

- 1.1 Powering Up UHF 2 for EVA Operations on 414.2 MHz
Perform {2.703 UHF 2 ORU ACTIVATION}, steps 1 to 16 (SODF: C&T: NOMINAL), then:

- 1.2 Configuring Audio Subsystem for EVA Operations
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL), then:

EMU

2. Helmet ←|→ HUT
3. Comm cap →|← electrical harness
4. √LTA installed
5. √Metox canister installed
√Battery installed

UIA

6. √OXYGEN EMU 1,2 vlv (two) – CLOSE

PCS

7. CONFIGURING O2 SYSTEM

Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve

cmd Open (√Actual Position – Open)

UIA

8. POWERING UP EMUs

- 8.1 √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: 850 to 950

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 2 of 8 pages

- C-Lk wall 8.2 Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk.
- DCM 8.3 Remove DCM Cover and affix with Velcro to DCM.
- 8.4 SCU →|← DCM
- √SCU locked

CAUTION

EMU must be on BATT power when UIA suit power is turned on.

- 8.5 sw POWER → BATT
- PSA 8.6 √sw SUIT SELECT (two) – OFF
 √sw EMU MODE EMU 1,2 (two) – PWR
- 8.7 sw MAIN POWER → ON
- √MAIN POWER LED – On
- 8.8 sw SUIT SELECT (two) → EMU 1,2
- √EMU 1,2 LEDs (two) – On
 √EMU 1,2 Volts: 18.0 to 19.0
- UIA 8.9 sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On

- DCM 8.10 sw POWER → SCU

9. CHECKING HARDLINE COMMUNICATION

- ATU 4,5 9.1 √EACP Y-cable →|← ATUs
- EACP 9.2 √EACP Y-cable →|← EACP
- sw PWR → ON
- √EMU 1,2 mode sel (two) – DUAL

NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used during this procedure.

- IV ATU 6 9.3 Connect headset.

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 3 of 8 pages

- | | | |
|-----------|---------------|---|
| ATU 4,5,6 | 9.4 | pb PTT → Press
pb 5 → Press

√Display – ‘ 5T ’ and other loops, as required
√Display – ‘ DUAL ’ |
| EV1,2 | 9.5 | Don comm caps. |
| DCM | 9.6 | sw COMM mode → HL |
| | 9.7 | Perform IV/EV comm check. |
| IV | ATU 4,
5,6 | 9.8 pb HANG UP → Press
pb 5 → Press |
| | EACP | 9.9 sw PWR → OFF |
| IV | ATU 6 | 10. <u>CHECKING EMU RADIOS/414.2 MHZ</u>
10.1 pb 1 → Press

√Display – ‘ 1TG ’ and other loops, as required
√Display – ‘ DUAL ’ |

NOTE

The EMUs will be hot mic to **MCC-H** on Public 1 once the COMM modes are taken out of hardline (HL) and the Comm FREQs are in LOW.

- | | | |
|-------|-----|--|
| EV1,2 | DCM | 10.2 sw COMM mode → PRI |
| | | 10.3 sw Comm FREQ → LOW |
| | | 10.4 √RF comm with MCC-H |
| | | 10.5 sw COMM mode → ALT |
| | | 10.6 Perform IV/EV comm check. |
| EV1,2 | DCM | 11. <u>CHECKING EMU RADIOS/417.1 MHZ</u>
11.1 sw Comm FREQ → HIGH |
| IV | PCS | 11.2 <u>Switching UHF 2 to High Frequency</u>
C&T: UHF 2: Configuration
<u>UHF Configuration</u>

sel Frequency

<u>UHF Frequency</u>

cmd High (√Pending Frequency: 417.1) |

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 4 of 8 pages

UHF Configuration

sel Set Actual Configuration

UHF Set Actual Configuration

cmd Send Command

UHF Configuration

Verify no Xs in the Miscompare column.

'Actual' (√Frequency: 417.1)

EV1,2 11.3 Perform IV/EV comm check.

EV1,2 DCM 11.4 sw COMM mode → PRI

11.5 Perform IV/EV comm check.

12. Doff comm caps.
Stow in left arm.

MCC-H/IV

13. DECONFIGURING AUDIO SUBSYSTEM FROM EVA OPERATIONS

PCS Perform {2.210 AUDIO SUBSYSTEM DECONFIGURATION FROM UHF OPS}, all (SODF: C&T: NOMINAL), then:

PRIMARY REGULATOR/FAN/PUMP CHECK (20 MINUTES/EMU)

DCM 14. √STATUS: O2 P: ≤ 950

Record O2 P on {1.406 EMU CHECKOUT RESULTS} Table (SODF: ISS EVA SYS: CHECKOUTS).
Report O2 P to **MCC-H** as comm permits.

UIA 15. OXYGEN EMU 1,2 vlv (two) → OPEN

16. Install helmet, lock.

17. √Suit arms aligned
√Gloves locked
√Helmet purge vlv – cl, locked

DCM 18. PURGE vlv → cl (dn)

19. O2 ACT → IV

20. √STATUS: SUIT P: 0.4 to 1.4 and stable (compare with gauge)

Record SUIT P on 1.406 EMU CHECKOUT RESULTS Table.

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 5 of 8 pages

21. O2 ACT → PRESS

DCM

22. √STATUS: SUIT P: 4.2 to 4.4 and stable (compare with gauge)

√STATUS: H2O TEMP = ambient

√STATUS: H2O GP/WP: 14.0 to 16.0

Record SUIT P, H2O TEMP, H2O GP/WP on 1.406 EMU CHECKOUT RESULTS Table.

23. O2 ACT → IV

Start timing manual leak check (2 minutes, SUIT $\Delta P \leq 0.3$ psi).

Record SUIT ΔP on 1.406 EMU CHECKOUT RESULTS Table.

* If $\Delta P \geq 0.3$ psi
* | Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)}
* | (SODF: ISS EVA SYS: EMU CONTINGENCY), then:

DCM

24. O2 ACT → OFF

25. PURGE vlv → op (up)

26. √STATUS: SUIT P < 0.4 (compare with gauge)

To completely equalize EMU ΔP

| 27. Glove ←|→ EMU

| Glove →|← EMU

28. Helmet ←|→ HUT

Stow helmet.

29. Waist ring ←|→ HUT

Secure LTA.

Remove Multiple Water Connector cover.

If LCVG filled with water

| 30. LCVG →|← Multiple Water Connector

| √Multiple Water Connector locked

If LCVG not filled with water

| 31. Cooling loop jumper →|← Multiple Water Connector

| √Multiple Water Connector locked

DCM

32. √Temp control vlv – Max C

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 6 of 8 pages

CAUTION

Minimize fan operation with O2 ACT – OFF (~ 2 minutes).

33. sw FAN → ON

Verify flow at neck ring vent port.

UIA 34. √PWR EV-1,2 AMPS: 1.5 to 6.5 (1.5 to 4.0 at 10.2 psia (527 mmHg))

Record PWR EV 1,2 AMPS on 1.406 EMU CHECKOUT RESULTS Table.

EMU 35. Install SCOF, lock.

DCM 36. O2 ACT → IV
NO VENT FLOW message, sw DISP → PRO

√Flow in Cooling Loop Jumper (LCVG)

37. √STATUS: H2O TEMP decrease from step 22

Record H2O TEMP on 1.406 EMU CHECKOUT RESULTS Table.

- * If no temperature decrease
- * | Depress and hold pump priming valve on back of
- * | EMU, while slowly cycling TCV between 7 and
- * | Max C (30 seconds minimum).

UIA 38. √PWR EV-1,2 AMPS: 1.5 to 4.0 (1.5 to 3.6 at 10.2 psia (527 mmHg))
√PWR EV-1,2 AMPS decrease from step 34

Record PWR EV-1,2 AMPS on 1.406 EMU CHECKOUT RESULTS Table.

DCM 39. sw POWER → BATT

DCM 40. √STATUS: BATT VDC ≥ 16.5
√STATUS: BATT AMPS: 2.4 to 4.0 (2.3 to 3.7 at 10.2 psia (527 mmHg))
√STATUS: RPM: 19.0 to 20.0 K

Record BATT VDC, BATT AMPS, RPM on 1.406 EMU CHECKOUT RESULTS Table.

41. √Fan noise steady

DCM 42. O2 ACT → OFF

43. sw FAN → OFF

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 7 of 8 pages

44. sw POWER → SCU

SOP CHECK (2 MINUTES/EMU)

DCM 45. ✓STATUS: SOP P: 5410 to 6800

Record SOP P on 1.406 EMU CHECKOUT RESULTS Table.

SOP 46. ✓SOP gauge 5400 to 6800

Note SOP interstage gauge.

Record SOP Gauge, INT Gauge on 1.406 EMU CHECKOUT RESULTS Table.

PCS 47. Airlock: ECLSS
Airlock ECLSS
'Equipment Lock'

✓Cab Temp

Record CAB TEMP on 1.406 EMU CHECKOUT RESULTS Table.

DCM 48. Cycle STATUS switch to display SUIT P.

NOTE

Minimize the duration of depressing the manual override to conserve SOP pressure.

SOP 49. While depressing SOP manual override (30 seconds maximum)

DCM | ✓SOP interstage gauge < 600

| ✓STATUS: SUIT P: 3.4 to 3.9 and stable

Record SUIT P, INT GAUGE on 1.406 EMU CHECKOUT RESULTS Table.

50. ✓STATUS: SOP P: 5410 to 6800

Record SOP P on 1.406 EMU CHECKOUT RESULTS Table.

If dry LCVG is to be filled

51. Cooling loop jumper ←|→ Multiple Water Connector

52. Dry LCVG →|← Multiple Water Connector

53. Perform {1.525 LCVG WATER FILL}, steps 6 to 17 (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

54. Perform {1.505 EMU WATER RECHARGE}, steps 1 to 34 (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

1.405 EMU CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 6/HC) Page 8 of 8 pages

- 55. Remove SCOF.
Stow SCOF in EMU Equipment Bag.
- DCM 56. sw COMM mode → OFF
- 57. sw Comm FREQ → LOW
- 58. LCVG (cooling loop jumper) ←|→ Multiple Water Connector
Stow LCVG in HUT.
Install Multiple Water Connector cover.
- 59. Install helmet, LTA.
- UIA 60. sw PWR EV-1,2 (two) → OFF
√PWR EV-1,2 LEDs (four) – Off
√PWR EV-1,2 VOLTS: ~ 00.0
- 61. OXYGEN EMU 1,2 vlv (two) → CLOSE
- PSA 62. sw SUIT SELECT (two) → OFF
√SUIT SELECT LEDs (four) – Off
- 63. sw MAIN POWER → OFF
√MAIN POWER LED – Off
- DCM 64. SCU ←|→ DCM
- 65. Install DCM cover.
- C-Lk wall 66. Insert SCU in stowage pouch.
- PCS 67. RECONFIGURING O2 SYSTEM
Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve
cmd Close (√Actual Position – Closed)
- MCC-H/IV**
PCS 68. POWERING DOWN UHF 2 AFTER EVA OPERATIONS
Go to {2.704 UHF 2 ORU DEACTIVATION}, all (SODF: C&T: NOMINAL).

1.406 EMU CHECKOUT RESULTS

(ISS EVA SYS/7A - ALL/FIN/Paper on ISS) Page 1 of 1 pages

OBJECTIVE:

To record the results of 1.405 EMU CHECKOUT. The step numbers correlate to the related steps in EMU CHECKOUT.

EMU	1	2	3
14. O2 P: ≤ 950 psi			

EMU	1	2	3
20. SUIT P (IV): 0.4 to 1.4 psi			

EMU	1	2	3
22. SUIT P (PRESS): 4.2 to 4.4 psi			
H2O TEMP: ambient			
H2O GP: 14 to 16 psi			
H2O WP: 14 to 16 psi			

EMU	1	2	3
23. SUIT Δ P: ≤ 0.3 psi			

EMU	1	2	3
34. PWR EV - 1,2 AMPS: 1.5 to 6.5 Amps			

EMU	1	2	3
37. H2O TEMP: decrease from 22			

EMU	1	2	3
38. PWR EV-1,2 AMPS: decrease from 34			

EMU	1	2	3
40. BATT VDC: ≥ 16.5			
BATT AMPS: 2.4 to 4.0			
RPM: 19.0 to 20.0 K			

EMU	1	2	3
45. SOP P: 5410 to 6800 psi			

EMU	1	2	3
46. SOP GAUGE: 5400 to 6800 psi			
INT GAUGE:			

47. CAB TEMP:	
---------------	--

EMU	1	2	3
49. INT GAUGE: < 600			
SUIT P: 3.4 to 3.9 psi			

EMU	1	2	3
50. SOP P: 5410 to 6800 psi			

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1.410 EMU MIDTERM CHECKOUT

(ISS EVA SYS/E8 - ALL/FIN 1)

Page 1 of 24 pages

I

(180 minutes)

OBJECTIVE:

This procedure verifies that EMU components are operating nominally following an extended period of down time and satisfies the maintenance requirements for extended on-orbit use.

NOTE

1. Steps 1.1 and 1.2 should nominally be completed by **MCC-H** prior to the start of checkout but are not required for steps 2 through 20.
2. This procedure is written for checkout of a single EMU.
3. No EMU Battery will be installed for this procedure. EMU will power down when POWER switch is taken to BATT.
4. Record results of parameters on {1.411 EMU MIDTERM CHECKOUT RESULTS} Table (SODF: ISS EVA SYS: CHECKOUTS).

**MCC-H/IV, EV
PCS**

1. CONFIGURING FOR EMU COMM

- 1.1 Powering Up UHF 2 for EVA Operations on 414.2 MHz
Perform {2.703 UHF 2 ORU ACTIVATION}, steps 1 to 16 (SODF: C&T: NOMINAL), then:
- 1.2 Configuring Audio Subsystem for EVA Operations
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL), then:

1.410 EMU MIDTERM CHECKOUT

(ISS EVA SYS/E8 - ALL/FIN 1)

Page 2 of 24 pages

2. Unstow the following hardware per the stowage note:

Item
EMU Equipment Bag: <ul style="list-style-type: none"><input type="checkbox"/> EMU Cooling Loop Jumper<input type="checkbox"/> SOP Checkout Fixture (SCOF)
EMU Servicing Kit: <ul style="list-style-type: none"><input type="checkbox"/> BTA Poppet Keeper<input type="checkbox"/> Scissors
<input type="checkbox"/> METOX Canister
<input type="checkbox"/> Serial Data Cable (SEG39136003-301) for EMU
ISS Tool Box: Drawer 4: <ul style="list-style-type: none"><input type="checkbox"/> Adjustable Joint Pliers (straight jaw) Drawer 5: <ul style="list-style-type: none"><input type="checkbox"/> Static Wrist Tether
<input type="checkbox"/> Video Camera, optional
<input type="checkbox"/> Video Tape, optional
<input type="checkbox"/> Airlock PCS
<input type="checkbox"/> PCS Floppy Disk Drive
<input type="checkbox"/> Three blank 3.5" Floppy Disks (or reuse one Disk)
<input type="checkbox"/> Flashlight
<input type="checkbox"/> Gray Tape
<input type="checkbox"/> Trash Bag (small)
<input type="checkbox"/> EMU Water Maintenance Dump Equipment, as required

EDDA 3. As required, relocate specified EMU.


4. As required, relocate a PCS to airlock.

EMU 5. Helmet ←|→ HUT

6. Contact **MCC-H** for water recharge and SCOF cycling requirements.

7. CYCLING SCOF RELIEF VALVE (IF REQUIRED)

7.1 Remove serrated nut from the BTA Poppet Keeper.
Temporarily stow (EMU Servicing Kit).

7.2 Refer to Figure 1.
Thread the Poppet Keeper  into SCOF relief valve; hand tighten; do not over tighten.

7.3 Pull up on the Poppet to open valve.
Release Poppet.
Verify valve spring retracts the Poppet.

1.410 EMU MIDTERM CHECKOUT

(ISS EVA SYS/E8 - ALL/FIN 1)

Page 3 of 24 pages

* If Poppet is difficult to grip, use Joint Pliers to grip Poppet
* head
* Tear a 3" strip of Gray Tape in half lengthwise.
* Wrap strips around each jaw of the Pliers to protect
* Poppet while gripped by Pliers.

7.4 Remove Poppet Keeper (thread ↺).

7.5 Repeat steps 7.2 through 7.4 for second SCOF (if required).

7.6 Temporarily stow Poppet Keeper.

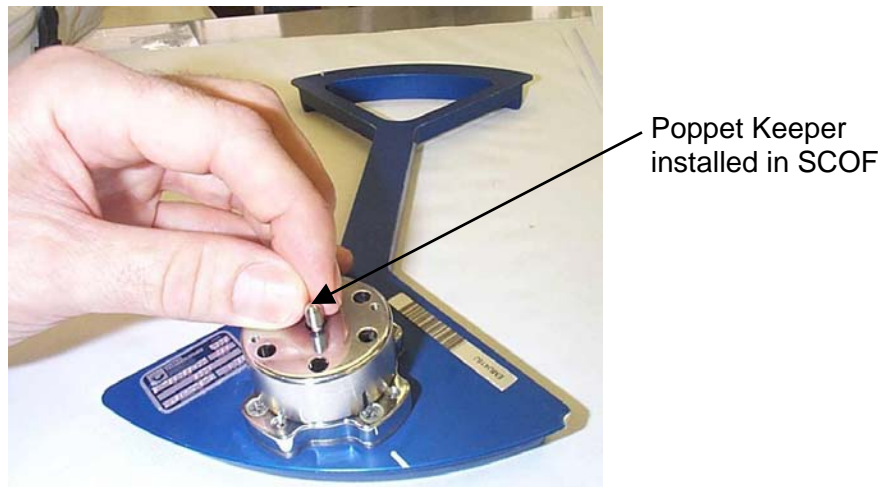


Figure 1.- SCOF Relief Valve Cycling.

8. REMOVING PLSS IMPACT SHIELD

CAUTION

When moving the TMG and the impact shield, be careful not to pull or kink the antenna wire connections on the PLSS (radio). Refer to Figures 2 and 3.

NOTE

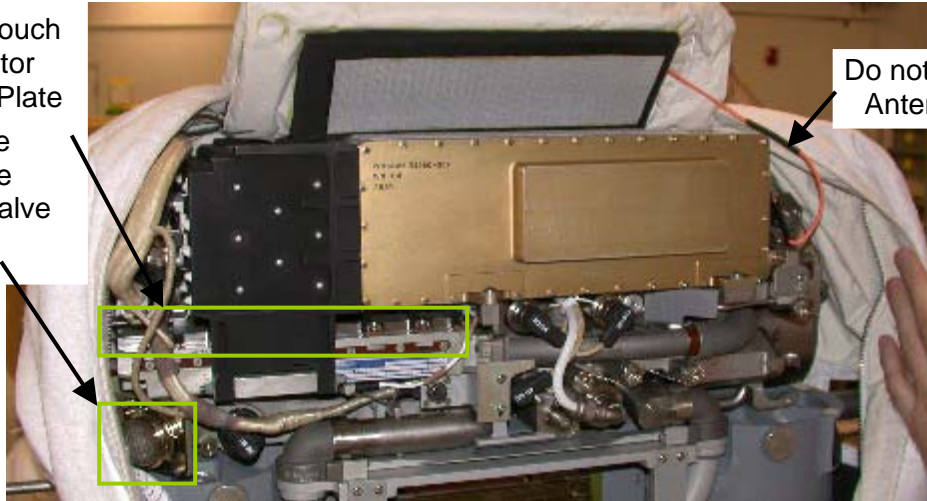
The EMU must be removed from the EDDA at the upper engagement pins to remove the impact shield and access the PPRV.

1.410 EMU MIDTERM CHECKOUT

(ISS EVA SYS/E8 - ALL/FIN 1)

Page 4 of 24 pages

Do not touch
Sublimator
Porous Plate
Negative
Pressure
Relief Valve



Do not kink or pull
Antenna Cable

Figure 2.- Caution Areas.

NOTE

When removing or installing the impact shield, watch for snags and cable protrusions on both ends.

1. If available, it is desirable to have two crewmembers to guide the shield (one on each end).
2. The shield Velcro tabs can get caught on the left side. Spread the lower part of impact shield gently to allow tabs to clear the hardware.
3. Take care to avoid the PPRV seal. The PPRV is located forward of the NPRV as seen in Figure 5.

Antenna
Velcro



Do not pull or kink
Antenna Cable

Impact Shield

Figure 3.- Antenna Cable and Impact Shield.

1.410 EMU MIDTERM CHECKOUT

(ISS EVA SYS/E8 - ALL/FIN 1)

Page 5 of 24 pages

- 8.1 Swing open EDDA to locked position to access the back of PLSS.
- 8.2 Remove EMU from EDDA upper engagement pins.
- 8.3 Refer to Figure 4.
Cut left and right zipper retaining tack threads (thin threads between larger loops).
Remove loose threads, place in trash.
Unzip PLSS back TMG completely.

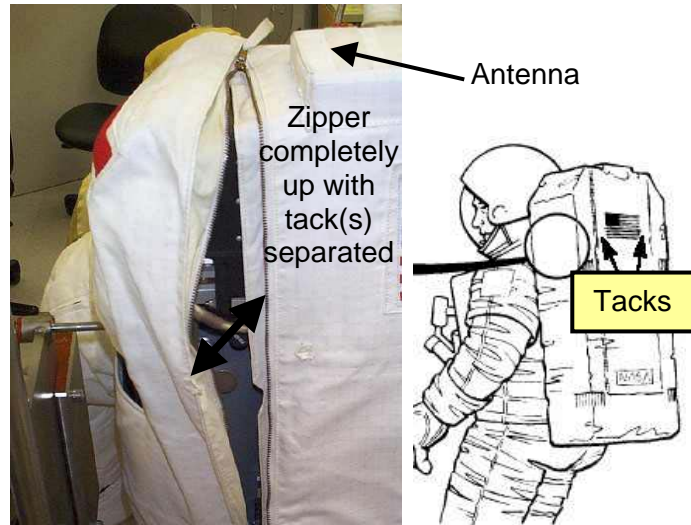


Figure 4.- Zipper Retaining Tacks and Antenna Locations.

- 8.4 Roll center TMG flap back, carefully detaching antenna Velcro from top of PLSS.
Refer to Figure 3.
- 8.5 Pull top right and left TMG around PLSS upper corners to access the impact shield.

CAUTION

Avoid contact with the Sublimator Porous Plate (top), the Negative Pressure Relief Valve (NPRV) protective screen, and Positive Pressure Relief Valve (PPRV) seals. Normally, these components are protected by the Impact Shield and TMG. Refer to Figures 2, 3, and 5.

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8.6 Refer to Figure 3.

Remove impact shield (pull up ~ 1/8 inch, then toward back of PLSS to release).

Temporarily stow.

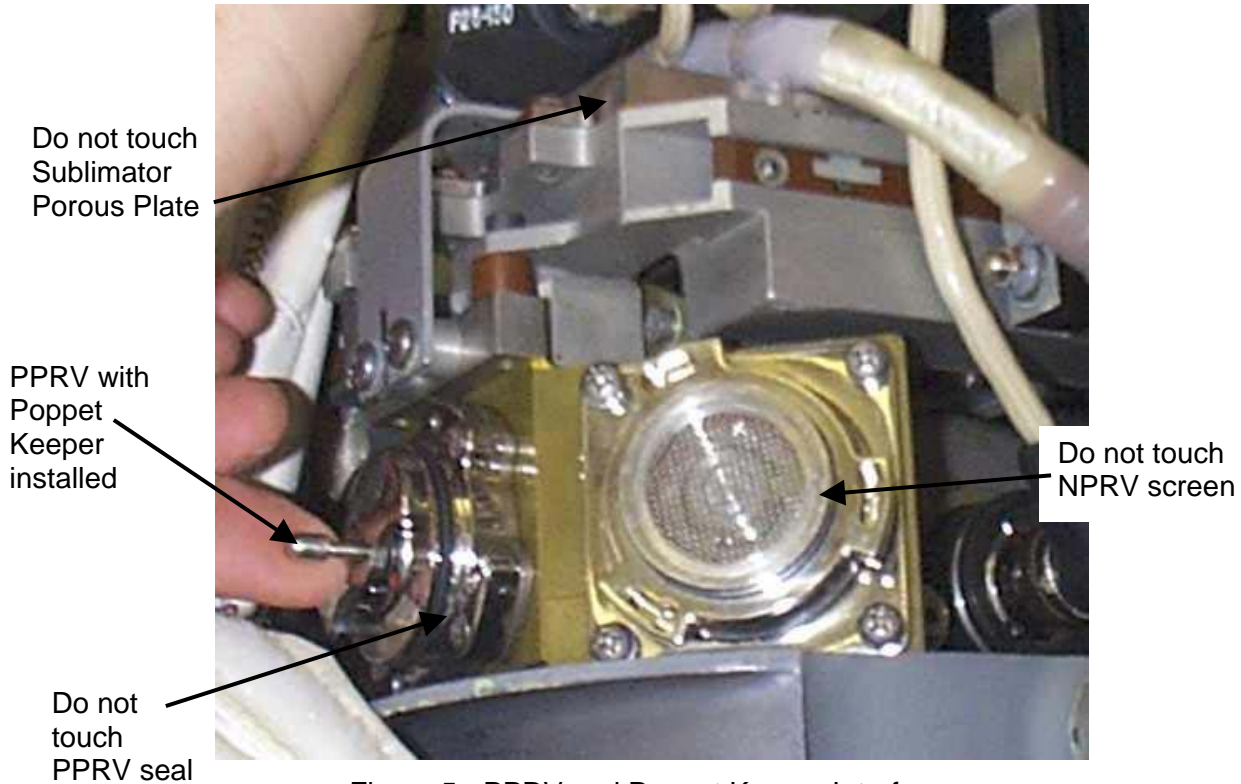


Figure 5.- PPRV and Poppet Keeper Interface.

9. CYCLING POSITIVE PRESSURE RELIEF VALVE (PPRV)

9.1 Refer to Figure 5.

Peel back TMG to expose Positive Pressure Relief Valve (PPRV).

9.2 Thread the Poppet Keeper ↻ into the PPRV; hand tighten.

9.3 Pull the Poppet to open valve.
Release Poppet.
Verify valve spring retracts Poppet.

9.4 Remove Poppet Keeper (thread ↻).

9.5 As required, replace serrated nut onto Poppet Keeper.
Restow in EMU Servicing Kit.

9.6 Close the TMG flap to protect back of PLSS, leave unzipped.

9.7 Reinstall EMU in EDDA upper engagement pins.

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EMU SERIAL DATA COLLECTION SETUP

- E-LK 10. Set up PCS in equipment lock near EMU.

NOTE

The PCS Floppy Drive must be connected to the PCS and then the PCS rebooted in order for the Floppy Disk Drive to be recognized by the PCS.

11. PCS Floppy Disk Drive →|← PCS

Reboot PCS.

12. Remove EMU Serial Data Cable connector covers.
Refer to Figure 6.

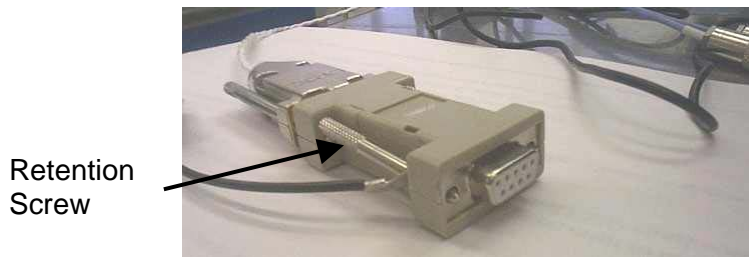


Figure 6.- Serial Data Cable with Retention Screws (shown retracted).

13. Open TMG flap.
Don static wrist tether.

Static wrist tether →|←lower EMU PLSS Battery attach post

This is the post that allows the Battery to pivot during installation.

- PCS 14. EMU Serial Data Cable (end labeled PCS/Serial Port) →|← PCS serial connector (9-pin) and secure with retention screws

* If retention screws are not being used per **MCC-H** direction
* Pull retention screws diagonally back (Figure 6).
*
* EMU Serial Data Cable (end labeled PCS/Serial Port
* →|← PCS serial connector (9-pin) without securing
* retention screws

- PLSS 15. Refer to Figure 7 for location of P4 connector.
If present, remove Kapton Tape from EMU P4 connector.
Place Tape in trash (not required to retape connector).

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P4 connector
(in pocket labeled
P4 /PCS)

Figure 7.- P4 EMU Serial Data Interface in
Back of EMU PLSS.

16. Inspect P4 connectors for damage or debris.
EMU Serial Data Cable (end labeled EMU/CWS Port) →|← P4
EMU connector
17. Doff static wrist tether.
Temporarily stow.

NOTE

The PCS will be needed later in this procedure to command and monitor parameters. If using the Airlock PCS for data commanding/recording, verify 1553 Bus remains connected.

- PLSS
18. Remove vent port plugs.
Temporarily stow in EMU Servicing Kit.
Install designated Metox Canister.
Report bar code to **MCC-H**.
 19. Close TMG flap to protect back of PLSS, leave unzipped.
 20. Close EDDA.
- If EMU water dump and fill is required
21. Comm cap ←|→ electrical harness

Temporarily stow.
 22. Perform {1.507 EMU WATER MAINTENANCE DUMP AND
FILL}, steps 2 to 58, 60, and 61 (SODF: ISS EVA SYS: EMU
MAINTENANCE), then:

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If EMU is not powered up	
UIA	23. √sw PWR EV-1,2 (two) – OFF √PWR EV-1,2 LEDs (four) – Off √EMU O2 SUPPLY PRESS gauge < 950
C-Lk Wall	24. Remove SCU 1(2) from stowage straps and pouches. Transfer SCU to E-Lk.
DCM	25. Remove DCM cover. Velcro to DCM. 26. SCU → ← DCM. √SCU locked 27. √Helmet ← → HUT 28. √Comm cap → ← electrical harness <div>CAUTION EMU must be in the BATT switch position when UIA suit power is turned on.</div> 29. sw POWER → BATT
PSA	30. √sw SUIT SELECT (two) – OFF √sw EMU MODE EMU 1(2) – PWR 31. sw MAIN POWER → ON √MAIN POWER LED – On 32. sw SUIT SELECT → EMU 1(2) √EMU 1(2) LEDs – On √EMU 1(2) volts 18.0 to 19.0
UIA	33. sw PWR EV-1(2) → ON √PWR EV-1(2) EMU LED – On 34. √EMU 1,2 OXYGEN vlv (two) – CLOSE
DCM	35. sw POWER → SCU

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36. CONFIGURING O2 SYSTEM

AL O2 Hi Pressure Supply Valve

36.2 C&W Summ

'Event Code Tools'

Enable an Event

cmd Execute

Two crewmembers are required for the following comm checks.

ATU 4,5 37. $\sqrt{\text{EACP}}$ Y-cable $\rightarrow| \leftarrow$ ATUs

sw PWR → ON

√EMU 1(2) mode sel – DUAL

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used during this procedure.

ATU 4, 40. pb PTT → Press
5,6 pb 5 → Press

EV	DCM	If EMU water dump and fill was performed
----	-----	--

42. Comm cap \rightarrow | \leftarrow electrical harness

1.410 EMU MIDTERM CHECKOUT

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43. Don comm cap.

EV DCM 44. sw COMM mode → HL

45. Perform IV/EV comm check.

IV ATU 4, 5,6 46. pb HANG UP → Press
pb 5 → Press

EACP 47. sw PWR → OFF

CHECKING EMU RADIOS/414.2 MHz

ATU 6 48. pb 1 → Press

√Display – 1TG and other loops, as required

√Display – DUAL

NOTE

The EMUs will be hot mic to **MCC-H** on public 1 once the COMM MODES are taken out of hardline (HL) and the COMM FREQs are in LOW.

EV DCM 49. sw COMM mode → PRI

50. √Comm FREQ – LOW

51. √RF comm with **MCC-H**

52. sw COMM mode → ALT

53. Perform IV/EV comm check.

CHECKING EMU RADIOS/417.1 MHz

DCM 54. sw Comm FREQ → HIGH

IV PCS 55. Switching UHF 2 to High Frequency
C&T: UHF 2: Configuration
UHF Configuration

sel Frequency

UHF Frequency

cmd High (√Pending Frequency: 417.1)

UHF Configuration

sel Set Actual Configuration

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UHF Set Actual Configuration

cmd Send Command

UHF Configuration

Verify no Xs in the Miscompare column.

Actual ($\sqrt{\text{Frequency}}$: 417.1)

56. Perform IV/EV comm check.

DCM 57. sw COMM mode → PRI

58. Perform IV/EV comm check.

59. Doff comm cap, stow in left arm of HUT.

**MCC-H/IV,EV
PCS**

60. [DECONFIGURING AUDIO SUBSYSTEM FROM EVA OPERATIONS](#)

Contact **MCC-H** to perform {2.210 AUDIO SUBSYSTEM DECONFIGURATION FROM UHF OPS}, all (SODF: C&T: NOMINAL), then:

61. [SETTING THE TIME AND INITIATING EMU LOGGER](#)

NOTE

The EMU logger will automatically begin logging data when step 61.4 is performed. The default Time Left for recording data is 15 minutes. This procedure will change the logging time to 50 minutes (maximum data to allow transfer by one Floppy Disk). It is not necessary to restart the logger unless directed to do so in the procedure. After 50 minutes, the logger will stop recording EMU data onto the PCS hard drive, but the application main display will continue displaying updated parameters.

PCS 61.1 Left click on arrow above the Pencil on the Paper icon to open the Personal Applications menu.

61.2 Click on Terminal item.

NOTE

PCS keyboard inputs are case/space sensitive, enter input (upper case, lower case, and spaces) as shown in steps below.

61.3 input – setenv CDS_LOGS /var/opt/PCS/logs
Press [ENTER].
input – cd /opt/PCS/EMU_logger/bin
Press [ENTER].

1.410 EMU MIDTERM CHECKOUT

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- 61.4 input – EMU_logger -time 50
Press [ENTER].
This will start the logger.
- 61.5 Verify Time Left 50:00 in first text line is decreasing.
Verify EMU data is being received (not all zeros).
- 61.6 Inform **MCC-H** GMT of logging start.
Record GMT on {1.411 EMU MIDTERM CHECKOUT RESULTS} Table (SODF: ISS EVA SYS: CHECKOUT),
then:

DCM 62. ✓STATUS: all

Verify no missing LCD segments.

63. Verify **MCC-H** is receiving good EMU data and is ready to proceed.

CHECKING PRIMARY REGULATOR/FAN/PUMP (20 MINUTES/EMU)

DCM 64. ✓STATUS: O2 P: 45 to 950

Record O2 P on EMU Midterm Checkout Results Table.
Report O2 P to **MCC-H** as comm permits.

UIA 65. EMU 1(2) OXYGEN vlv → OPEN

DCM 66. ✓STATUS: O2 P: 850 to 950 and stable

PCS 67. Airlock: ECLSS
Airlock ECLSS
'Equipment Lock'

✓Cab Press

✓Cab Temp

'Oxygen System'

✓UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia)

Record UIA Supply Press, Cab Temp, and Cab Press on EMU Midterm Checkout Results Table.

68. Install helmet, lock.

69. ✓Suit arms aligned
✓Gloves locked
✓Helmet purge vlv – cl, locked
✓LTA installed

1.410 EMU MIDTERM CHECKOUT

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DCM 70. PURGE vlv → cl (dn)

71. O2 ACT → PRESS

NOTE

The EMU takes ~ 5 min to pressurize when unmanned.

DCM 72. √STATUS: **SUIT P**: 4.2 to 4.4 and stable (compare with gauge)

√STATUS: **AIRLK P**: ambient

√STATUS: **H2O TEMP**: ambient

√STATUS: **H2O GP/WP**: 14.0 to 16.0

Record SUIT P, AIRLK P, H2O TEMP, H2O GP/WP on EMU Midterm Checkout Results Table.

CAUTION

Do not take O2 actuator to EVA if suit pressure is less than 4.0 psi to prevent inadvertent use of SOP gas.

DCM 73. √STATUS: **SUIT P** ≥ 4.2

O2 ACT → EVA

√STATUS: **O2 POS EVA**

74. O2 ACT → IV

Start timing manual leak check (4 minutes, SUIT $\Delta P \leq 0.3$ psi).

Record SUIT ΔP on EMU Midterm Checkout Results Table.

* If $\Delta P \geq 0.3$ psi

* Contact **MCC-H**.

* Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)},
* all (SODF: ISS EVA SYS: EMU CONTINGENCY), then:

*

*

*

*

*

*

NOTE

When performing {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)}, time manual leak check for 4 minutes, not the specified 1 or 2 minutes.

DCM 75. O2 ACT → OFF

76. PURGE vlv → op (up)

77. √STATUS: **SUIT P** < 0.4 (compare with gauge)

1.410 EMU MIDTERM CHECKOUT

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To completely equalize EMU ΔP

78. Glove $\leftarrow| \rightarrow$ EMU
Glove $\rightarrow| \leftarrow$ EMU

79. Helmet $\leftarrow| \rightarrow$ HUT

Stow helmet.

80. Waist ring $\leftarrow| \rightarrow$ HUT

Secure LTA.

Remove multiple water connector cover.

81. Cooling loop jumper $\rightarrow| \leftarrow$ Multiple water connector

✓Multiple water connector locked

- DCM 82. Temp control vlv \rightarrow 7

RESTARTING EMU DATA LOGGER

EMU_logger

- PCS If Time Left in first text line > 00:00 (i.e., still logging data)

83. sel Start/Stop Logging from Control menu

✓'Not Logging' message displayed in first text line

84. sel Start/Stop Logging from Control menu

Inform **MCC-H** GMT of logging start.

Record GMT in EMU Midterm Checkout Results Table.

85. Verify 'Time Left 50:00' in first text line is decreasing.
Verify EMU data is being received (not all zeros).

NOTE

Fan must be run for 2 hours minimum to mix the bearing grease. There is no need to monitor for the entire 2 hours.

CAUTION

Minimize fan operation with O2 ACT – OFF (~ 2 minutes).

- DCM 86. sw FAN \rightarrow ON

Record GMT start, PET = 0:00, in EMU Midterm Checkout Results Table.

Inform **MCC-H**.

Verify flow at neck ring vent port.

1.410 EMU MIDTERM CHECKOUT

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UIA 87. ✓PWR EV-1(2) AMPS: 1.5 to 6.5

Record EV-1(2) AMPS in EMU Midterm Checkout Results Table.

88. Install SCOF, lock.

DCM 89. O2 ACT → IV

Expect **NO VENT FLOW** message.

sw DISP → PRO

✓STATUS: **SUIT P**: 0.4 to 1.4 and stable

Record SUIT P in EMU Midterm Checkout Results Table.

90. Depress and hold pump priming valve on back of EMU for 30 seconds minimum using finger.
Check for flow near multiple water connector.

91. ✓STATUS: **H2O TEMP** decrease from step 72

Record H2O TEMP in EMU Midterm Checkout Results Table.

PCS 92. Airlock: TCS
Airlock TCS
'LAB RFCA NODE 1 LTL'

✓HR Flow \geq 45 kg/hr

✓Temp

Record HR Flow and TEMP in EMU Midterm Checkout Results Table.

* If no temperature decrease and no flow (bubble movement)
* | Depress and hold pump priming valve on back of EMU
* | (30 seconds minimum) while slowly cycling TCV through
* | Max H to Max C and back to 7.

NOTE

With the SCOF installed and the O2 ACT in PRESS, the retired-in-place SOP checkout package may relieve oxygen into the cabin. Minimize time in PRESS.

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DCM If SCOF relief valve was cycled in step 7

- 93. O2 ACT → PRESS
- 94. √STATUS: SUIT P: 4.2 to 4.4 and stable
- 95. Verify no airflow at SCOF relief valve.
- 96. O2 ACT → IV

UIA 97. √PWR EV-1(2) AMPS: 1.5 to 4.1
 √PWR EV-1(2) AMPS decrease from step 87

Record EV-1(2) AMPS in EMU Midterm Checkout Results Table.

DCM When FAN ON PET \geq 02:00

- 98. O2 ACT → OFF
- 99. sw FAN → OFF

PLSS 100. Remove SCOF.
 Stow in EMU Equipment Bag.

If second SCOF relief valve was cycled in step 7.5

- 101. Install second SCOF, lock.
- 102. O2 ACT → PRESS
- 103. √STATUS: SUIT P: 4.2 to 4.4 and stable
- 104. Verify no airflow at SCOF relief valve.
- 105. O2 ACT → OFF
- 106. Remove SCOF.
 Stow in EMU Equipment Bag.

107. sw POWER → BATT

108. Open EDDA to locked position to access the back of PLSS.

109. Open PLSS TMG flap.

INSPECTING FOR LOOSE WATER

110. Using flashlight, inspect for water around PLSS valve module area.
Refer to Figure 8.

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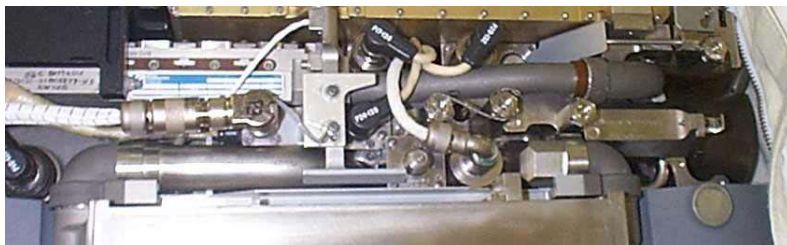


Figure 8.- PLSS Valve Module Area.

111. Using flashlight, inspect for water in left and right upper TMG vent ports.
Refer to Figures 9 and 10.



Figure 9.- Upper Vent Port.



Figure 10.- Upper Vent Port.

112. Using flashlight, inspect for water around HUT to PLSS interface and inside HUT at the backside of the T-11 port.
Refer to Figure 11.

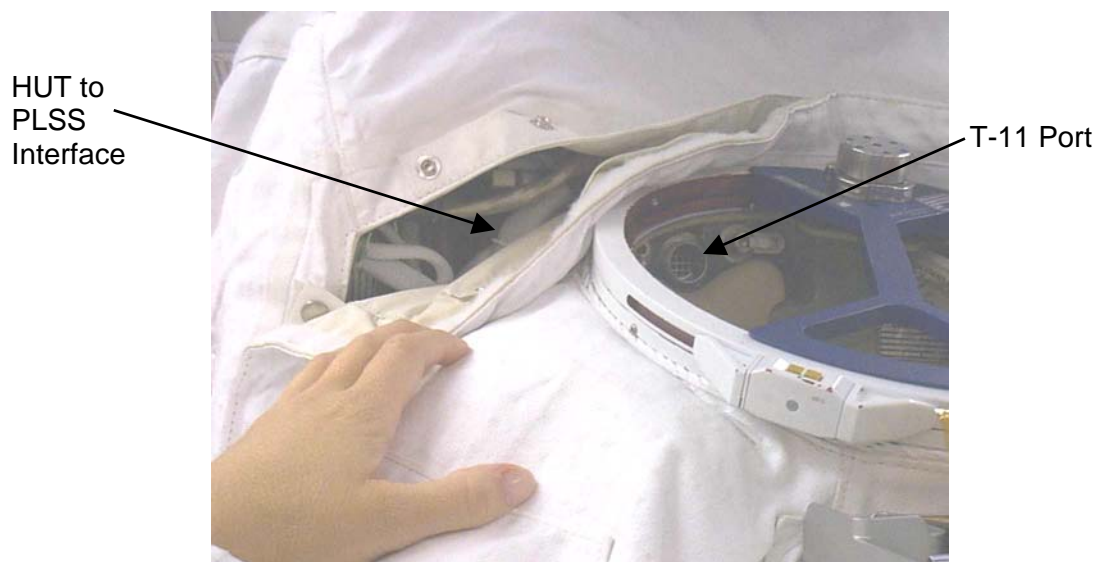


Figure 11.- HUT Interface and T-11 Port.

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113. Using flashlight, inspect for water around HUT to DCM interface and TMGs.
Refer to Figures 12 and 13.

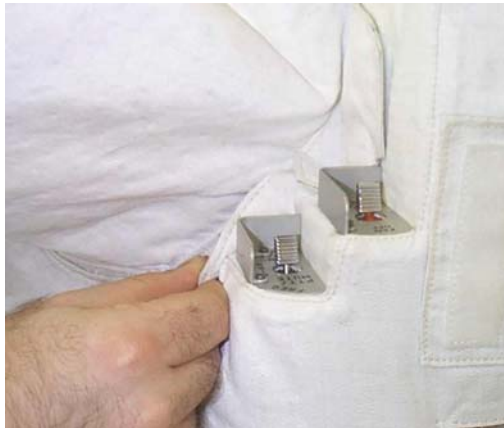


Figure 12.- DCM Water Inspection.



Figure 13.- DCM Water Inspection.

QUITTING EMU DATA LOGGER/FILE TRANSFER

PCS 114. EMU_logger

sel Control menu
sel Exit

115. Close any remaining EMU logger windows.

116. Don static wrist tether.

Static wrist tether →|←lower EMU PLSS Battery attach post

PLSS 117. EMU Serial Data Cable (end labeled EMU/CWS Port) ←|→ P4 EMU connector.

Stow P4 EMU connector in TMG pocket labeled P4/PCS.

118. Doff static wrist tether, stow.

CAUTION

1. When replacing the impact shield and TMG, care must be taken to not pull on the antenna wire that is routed from the top, center TMG to the PLSS (radio).
2. Avoid contact with the Sublimator Porous Plate (top), the Negative Pressure Relief Valve (NPRV) protective screen, and Positive Pressure Relief Valve (PPRV) seals. Normally, these components are protected by the impact shield and TMG. Refer to Figures 2, 3, and 5.

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NOTE

When installing the impact shield, watch for snags and cable protrusions on both ends.

1. The TMG zipper should be fully open.
2. If available, it is desirable to have two crewmembers to guide the shield (one on each end).
3. The shield Velcro tabs can get caught on the left side. Spread the lower part of impact shield gently to allow tabs to clear the hardware.
4. Take care to avoid the PPRV seal. The PPRV is located forward of the NPRV as seen in Figure 5.

REINSTALLING IMPACT SHIELD

119. If required, remove EMU from EDDA to install impact shield.
Reinstall impact shield.

√Velcro tabs are back in place

- PLSS 120. Remove Metox Canister and install cap.
Stow in M-02 Bag.
Install vent port plugs.

121. Close TMG flap around top, right and left corners of impact shield.

√Antenna connections are tight and free of kinks

122. Place finger in TMG pocket for pump priming valve.
Partially close right and left TMG zippers while guiding TMG pocket into pump priming valve access area.

123. Don comm cap.

- DCM 124. sw POWER → SCU

√PWR RESTART message displays

√BITE extinguishes

√Tones are audible (both warble and steady)

125. Doff comm cap.
Stow in left arm of HUT.

126. Cooling loop jumper ←|→ Multiple water connector.
Stow.

Install multiple water connector cover.

127. Install helmet, LTA.

128. Close PLSS TMG zipper.
Close EDDA.

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129. Verify good EMU data with **MCC-H**.

POWERING DOWN EMU

DCM 130. sw COMM mode → OFF
sw Comm FREQ → LOW

UIA 131. PWR EV-1(2) → OFF
√PWR EV-1,2 LEDs (four) – Off
√PWR EV-1,2 VOLTS: ~ 00.0

132. EMU 1,2 OXYGEN vlv (two) → CLOSE

PSA 133. sw SUIT SELECT → OFF
√SUIT SELECT LEDs (four) – Off

134. sw MAIN POWER → OFF
√MAIN POWER LED – Off

DCM 135. SCU ←|→ DCM

136. Install DCM cover.

C-Lk 137. Insert SCU in stowage pouch.
Wall

VERIFYING EMU LOG FILES ON PCS

NOTE

1. PCS automatically saves each EMU log file with the name EMU_log_mm_dd_hh_mm in the directory /var/opt/PCS/logs (mm_dd_hh_mm represent the month and day and hour and minute the logger file was started). A 50-minute log file should be approximately 1270 KB (1.3 MB).
2. PCS keyboard inputs are case/space sensitive, enter input (upper case, lower case, and spaces) as shown in the following steps.

SSC 138. √Floppy Disk formatted on SSC for use with DOS operating system

PCS 139. Insert Floppy Disk into PCS Floppy Drive.

140. Left click on arrow above the Pencil on the Paper icon to open the Personal Applications menu.
Click on Terminal item.

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NOTE

No command line response expected in step 141, but the floppy drive access light should illuminate for several seconds. If no Floppy Disk in the drive, no error message will be given.

141. input – v o i c h e c k to mount the floppy
Press [ENTER].
No response expected.

NOTE

The use of the previous/ directory depends on how many times the PCS is rebooted. If the PCS has not been rebooted since the log files were created, the log files will only be in /var/opt/PCS/logs/. If the PCS has been rebooted once, use /var/opt/PCS/logs/previous/. If it has been rebooted twice, use /var/opt/PCS/logs/previous-1/; if three times, use /previous-2, etc.

142. Click on the File Cabinet icon to open the File Manager application.

File Manager

143. Click on the folder above the forward slash “ / ” to go to the root directory.
144. Click on folders to continue navigation to the var/opt/PCS/logs folder.
145. Highlight EMU_log_mm_dd_hh_mm file to be copied (single left click)

File Manager

146. sel Selected menu
sel Copy to....

NOTE

1. The log file names are longer than eight characters. Since the Floppy Disk uses DOS naming conventions, the files must be renamed to eight characters maximum when they are copied to the Floppy Disk.
2. EMU_log_mm_dd_hh_mm represents all EMU log files to be renamed to a new file name EMUX where X = 1 or 2, or 3, etc. Also, the EMU_logger.out file will be copied and renamed to the new file name EMU_log.
3. The floppy drive access light will illuminate while the copy is in progress. The copy is complete when the access light turns off. Note any error messages indicating that the Disk is full or other error during the copy.

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147. Enter destination folder as /floppy/floppy0 and new copied file name as EMUX as required (where X = 1, 2, or 3, etc.)
Click OK.
148. Repeat steps 145 to 147 as required for additional log files.
149. Repeat steps 145 to 147 for EMU_logger.out file with new-copied name as EMU_log.

If Floppy Disk is full

150. Perform steps 151 to 157, then return to step 138 with new Floppy.

VERIFYING LOG FILES ON FLOPPY DISK

NOTE

A 15-minute log file should be approximately 380 KB and a 50-minute log file about 1.3 MB.

151. Click on the File Cabinet icon to open a second File Manager application window or click on the folder above the forward slash “ / ” to go to the root directory and continue navigation to the floppy/floppy0 folder.

152. Verify all log files copied and shown on floppy disk with appropriate size.

If file details not displayed in window view

File Manager

153. sel View menu
sel Set View Options
sel By name, date, size... (under Representation area)

Click OK.

154. Close any File Manager window viewing floppy disk files.

EJECTING FLOPPY DISK FROM PCS

NOTE

1. If the user has the file manager application viewing the floppy0 directory, an error message will occur when trying to eject. This message can be closed with no impact.
2. The Eject command is very important. It unmounts the floppy before volcheck can mount a new floppy.

155. Make Terminal window from step 61.2 active window.
input eject on command line.
Press [ENTER].

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156. Click OK on pop-up window as shown in Figure 14.



Figure 14.- Floppy Disk Eject Message.

157. Remove Floppy Disk from PCS drive by pressing blue eject button.

- PCS 158. As required, power off PCS.

EMU Serial Data Cable (end labeled PCS/Serial Port) ←|→ PCS serial connector (9-pin).

Install EMU Serial Data Cable connector covers.

- E-LK 159. Stow EMU Serial Data Cable.
Stow PCS (as required).

- SSC 160. Transfer log files from Floppy Disk to the OPS LAN k:\OCA down\EMU for OCA downlink (EMU folder may need to be created).

161. Inform **MCC-H** when file(s) transfer complete.

- MCC-H** 162. Retrieve log file(s) from OPS LAN directory k:\OCA-down\EMU.

163. As required, restow tools.

164. RECONFIGURING O2 SYSTEM

MCC-H/IV,EV
PCS

- 164.1 Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve

cmd Close (√Actual Position – Closed)

- 164.2 C&W Summ

Caution & Warning Summary
'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 6 0 3 (O2 UIA Supply Pressure Low-A/L)

cmd Arm

cmd Execute

MCC-H/IV,EV
PCS

165. POWERING DOWN UHF 2 AFTER EVA OPERATIONS

Go to {2.704 UHF 2 ORU DEACTIVATION}, all (SODF: C&T: NOMINAL).

1.411 EMU MIDTERM CHECKOUT RESULTS TABLE

(ISS EVA SYS/E8 - ALL/FIN/Paper on ISS) Page 1 of 1 page

OBJECTIVE:

To record the results of 1.410 EMU MIDTERM CHECKOUT. The numbers of these steps correlate to the related steps in EMU Midterm Checkout.

61.6 Logging Start	GMT ____/____:____	GMT ____/____:____	GMT ____/____:____
--------------------	-----------------------	-----------------------	-----------------------

EMU	1	2	3
64. O2 P: 45 - 950 psi			

EMU	1	2	3
67. UIA Supply P 5343-6308 kPa			
CAB TEMP			
CAB PRESSURE			

EMU	1	2	3
72. SUIT P (PRESS): 4.2 - 4.4 psi			
AIRLK P: ambient			
H2O TEMP: ambient			
H2O GP: 14 - 16 psi			
H2O WP: 14 - 16 psi			

EMU	1	2	3
74. SUIT ΔP: ≤ 0.3 psi			

84. Logging Start	GMT ____/____:____	GMT ____/____:____	GMT ____/____:____
-------------------	-----------------------	-----------------------	-----------------------

86. Fan → On	GMT ____/____:____	GMT ____/____:____	GMT ____/____:____
--------------	-----------------------	-----------------------	-----------------------

EMU	1	2	3
87. PWR EV - 1(2): 1.5 - 6.5 Amps			

EMU	1	2	3
89. SUIT P: 0.4 - 1.4 psi			

EMU	1	2	3
91. H2O TEMP: decrease from 72			

92. HR flow ≥ 45 kg/hr			
TEMP			

EMU	1	2	3
97. PWR EV-1,2:decrease from 87			

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1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 1 of 9 pages

I

(105 Minutes)

OBJECTIVE:

Given a Power Supply Assembly (PSA) that has failed such that it cannot provide power to the EMU(s), this procedure checks out the EMU(s) using the internal EMU battery power.

NOTE

1. Procedure assumes that the PSA is not capable of providing SCU power to the EMUs.
2. Procedures are written for simultaneous checkout of two EMUs.
3. **PWR RESTART** message occurs and BITE light is illuminated whenever EMU power is cycled.
4. Steps 1.1 and 1.2 should nominally be completed by **MCC-H** prior to the start of checkout, but are not required for steps 2 through 11.
5. Record results of parameters on {1.416 EMU CHECKOUT ON BATTERY POWER RESULTS} Table (SODF: ISS EVA SYS: CHECKOUTS).

MCC-H/IV
PCS

1. CONFIGURING FOR EMU COMM

- 1.1 Powering Up UHF 2 for EVA Operations on 414.2 MHz
Perform {2.703 UHF 2 ORU ACTIVATION}, steps 1 to 16 (SODF: C&T: NOMINAL), then:
- 1.2 Configuring Audio Subsystem for EVA Operations
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL), then:

PCS

2. CONFIGURING O2 SYSTEM

Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve

cmd Open (√Actual Position – Open)

UIA

3. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√OXYGEN EMU 1,2 vlv (two) – CLOSE
√EMU O2 SUPPLY PRESS gauge: 850 to 950

C-Lk
wall

4. Remove SCUs from stowage straps and pouches.
Transfer SCU to E-Lk.

DCM

5. Remove DCM covers.
Affix covers with Velcro and attach to DCM.

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 2 of 9 pages

	6.	SCU → ← DCM
		√SCU locked
	7.	Helmet ← → HUT
	8.	Comm Cap → ← Electrical Harness
	9.	√LTA installed
PLSS	10.	√Metox canister installed √Battery installed
DCM	11.	sw POWER → BATT √STATUS: BATT VDC ≥ 16.5
EV1,2	12.	Don comm caps. If PSA is capable of powering UIA for HL comm checks
PSA	13.	√sw SUIT SELECT (two) – OFF
	14.	sw MAIN POWER → ON √MAIN POWER LED – On
UIA	15.	√PWR EV-1,2 volts: 0.0 √PWR EV-1,2 amps: 0.0 √PWR EV-1,2 EMU LEDs (two) – Off
ATU 4,5	16.	<u>CHECKING HARDLINE COMMUNICATION</u>
EACP	16.1	√EACP Y-cable → ← ATUs
	16.2	√EACP Y-cable → ← EACP sw PWR → ON √EMU1,2 mode sel (two) – DUAL
		<div style="border: 1px solid black; padding: 5px; text-align: center;"><u>NOTE</u> Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used during this procedure.</div>
IV	ATU 6	16.3 Connect headset.
IV	ATU 4, 5,6	16.4 pb PTT → Press pb 5 → Press

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 3 of 9 pages

		√Display – '5T'
		√Display – 'DUAL'
	DCM	16.5 sw COMM mode → HL
		16.6 Perform IV/EV comm check.
IV	ATU 4, 5,6	16.7 pb HANG UP → Press pb 5 → Press
	EACP	16.8 sw PWR → OFF
	PSA	16.9 sw MAIN POWER → OFF
		√MAIN POWER LED – Off

17. CHECKING EMU RADIOS/414.2 MHz

IV	ATU 6	17.1 pb 1 → Press
		√Display – '1T' and other loops, as required
		√Display – 'DUAL'

NOTE

The EMUs will be hot mic to **MCC-H** on Public 1 once the COMM modes are taken out of hardline (HL) and the Comm FREQs are in LOW.

EV1,2	DCM	17.2 sw COMM mode → PRI
		17.3 sw Comm FREQ → LOW
		17.4 √RF comm with MCC-H .
		17.5 sw COMM mode → ALT
		17.6 Perform IV/EV comm check.

18. CHECKING EMU RADIOS/417.1 MHz

EV1,2	DCM	18.1 sw Comm FREQ → HIGH
IV	PCS	18.2 <u>Switching UHF 2 to High Frequency</u> C&T: UHF 2: Configuration <u>UHF Configuration</u> sel Frequency <u>UHF Frequency</u>

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 4 of 9 pages

cmd High (√Pending Frequency: 417.1)

UHF Configuration

sel Set Actual Configuration

UHF Set Actual Configuration

cmd Send Command

UHF Configuration

Verify no Xs in the Miscompare column.

'Actual' (√Frequency: 417.1)

EV1,2 18.3 Perform IV/EV comm check.

EV1,2 DCM 18.4 sw COMM mode → PRI

18.5 Perform IV/EV comm check.

19. Doff comm caps.

MCC-H/IV 20. DECONFIGURING AUDIO SUBSYSTEM FROM EVA OPERATIONS

PCS Perform {2.210 AUDIO SUBSYSTEM DECONFIGURATION FROM UHF OPS}, all (SODF: C&T: NOMINAL), then:

PRIMARY REGULATOR/FAN/PUMP CHECK (20 MINUTES/EMU)

DCM 21. √STATUS: O2 P ≤ 950

Record O2 P on {1.416 EMU CHECKOUT ON BATTERY POWER RESULTS} Table (SODF: ISS EVA SYS: CHECKOUT).
Report O2 P to **MCC-H** as comm permits.

UIA 22. OXYGEN EMU 1,2 vlv (two) → OPEN

23. Install helmet, lock.

24. √Suit arms aligned
√Gloves locked
√Helmet purge vlv – cl, locked

DCM 25. PURGE vlv → cl (dn)

26. O2 ACT → IV

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 5 of 9 pages

Expect **O2 USE HIGH** message

sw DISP → PRO

27. √STATUS: **SUIT P**: 0.4 to 1.4 and stable (compare with gauge)

Record SUIT P on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

28. O2 ACT → PRESS

Expect **O2 USE HIGH** message

sw DISP → PRO

Expect **TIME LF/ % O2 LF** message

sw DISP → PRO

29. √STATUS: **SUIT P**: 4.2 to 4.4 and stable (compare with gauge)

√STATUS: **H2O TEMP** = ambient

√STATUS: **H2O GP/WP**: 14.0 to 16.0

Record SUIT P, H2O TEMP, H2O GP/WP on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

DCM 30. O2 ACT → IV

Start timing manual leak check (2 minutes, SUIT $\Delta P \leq 0.3$ psi).
Record ΔP on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

```
*****
* If  $\Delta P \geq 0.3$  psi
* |   Perform {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)}
* |   (SODF: ISS EVA SYS: EMU CONTINGENCY), then:
*****
```

DCM 31. O2 ACT → OFF

32. PURGE vlv → op (up)

33. √STATUS: **SUIT P** < 0.4 (compare with gauge)

To completely equalize EMU ΔP

34. Glove ←|→ EMU
Glove →|← EMU

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 6 of 9 pages

35. Helmet ←|→ HUT

Stow helmet.

36. Waist Ring ←|→ HUT

Secure LTA.

37. Remove Multiple Water Connector cover.

If LCVG filled with water

38. LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

If LCVG not filled with water

39. Cooling Loop Jumper →|← Multiple Water Connector

√Multiple Water Connector locked

DCM 40. √Temp control vlv – Max C

CAUTION

1. Minimize fan operation with O2 ACT – OFF (~2 minutes).
2. Do not set O2 ACT to EVA in step 41.

41. sw FAN → ON

Expect **BATT AMPS HI/SET O2 EVA** message

sw DISP → PRO

Verify flow at neck ring vent port

42. √STATUS: **BATT AMPS**: 2.4 to 6.5 (2.3 to 4.0 at 10.2 psia)

Record on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

43. Install SCOF, lock.

DCM 44. O2 ACT → IV

Expect **NO VENT FLOW** message

sw DISP → PRO

√Flow in Cooling Loop Jumper (LCVG)

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 7 of 9 pages

45. ✓STATUS: **BATT AMPS**: 2.4 to 4.0 (2.3 to 3.7 at 10.2 psia)
✓STATUS: **BATT AMPS** decrease from step 42
✓STATUS: **RPM**: 19.0 to 20.0 K
✓STATUS: **H2O TEMP** decrease from step 29

Record BATT AMPS, RPM, H2O TEMP on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

46. ✓Fan noise steady

- DCM 47. O2 ACT → OFF
Expect **O2 IS OFF** message

sw DISP → PRO

48. sw FAN → OFF

SOP CHECK (2 MINUTES/EMU)

- DCM 49. ✓STATUS: **SOP P**: 5410 to 6800

Record SOP P on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

- SOP 50. ✓SOP gauge 5400 to 6800

Note SOP interstage gauge.

Record SOP Gauge, INT Gauge on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

- PCS 51. Airlock: ECLSS
Airlock ECLSS
'Equipment Lock'

✓Cab Temp

Record CAB TEMP on 1.416 EMU CHECKOUT ON BATTERY POWER CHECKOUT RESULTS Table.

- DCM 52. sw DISP → STATUS until **SUIT P**. displayed

NOTE

Minimize the duration of depressing the manual override to conserve SOP pressure.

- SOP 53. While depressing SOP manual override (30 seconds maximum)
DCM | ✓SOP interstage gauge < 600
| ✓STATUS: **SUIT P**: 3.4 to 3.9 and stable

Record INT Gauge, SUIT P on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 8 of 9 pages

If dry LCVG is to be filled

54. Cooling Loop Jumper $\leftarrow| \rightarrow$ Multiple Water Connector

55. Dry LCVG $\rightarrow| \leftarrow$ Multiple Water Connector

56. Perform {1.525 LCVG WATER FILL}, steps 6 to 17 (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

If PSA is capable of powering IRU

57. Perform {1.505 EMU WATER RECHARGE}, steps 1 to 31 (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

58. Remove SCOF.
Stow SCOF in EMU Equipment Bag.

DCM 59. sw COMM mode \rightarrow OFF

60. sw Comm FREQ \rightarrow LOW

61. LCVG (cooling loop jumper) $\leftarrow| \rightarrow$ Multiple Water Connector

Stow LCVG in HUT.

62. Install Multiple Water Connector cover.

63. Install helmet, LTA.

UIA 64. OXYGEN EMU 1,2 vlv (two) \rightarrow CLOSE

DCM 65. \surd STATUS: BATT VDC

Record BATT VDC on 1.416 EMU CHECKOUT ON BATTERY POWER RESULTS Table.

66. sw POWER \rightarrow SCU

67. SCU $\leftarrow| \rightarrow$ DCM

68. Install DCM cover.

C-Lk wall 69. Insert SCU in stowage pouch.

70. RECONFIGURING O2 SYSTEM

PCS Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve

cmd Close (\surd Actual Position – Closed)

1.415 EMU CHECKOUT ON BATTERY POWER

(ISS EVA SYS/7A - ALL/FIN 6) Page 9 of 9 pages

MCC-H/IV
PCS

71. POWERING DOWN UHF 2 AFTER EVA OPERATIONS

Go to {2.704 UHF 2 ORU DEACTIVATION}, all
(SODF: C&T: NOMINAL).

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1.416 EMU CHECKOUT ON BATTERY POWER RESULTS

(ISS EVA SYS/E8 - ALL/FIN/Paper on ISS) Page 1 of 1 page

OBJECTIVE:

To record the results of 1.415 EMU CHECKOUT ON BATTERY POWER. The numbers of these steps correlates to the related steps in EMU Checkout on Battery Power.

EMU	1	2	3
21. O2 P: ≤950 psi			

EMU	1	2	3
27. SUIT P (IV): 0.4 to 1.4 psi			

EMU	1	2	3
29. SUIT P (PRESS): 4.2 to 4.4 psi			
H2O TEMP: ambient			
H2O GP: 14 to 16 psi			
H2O WP: 14 to 16 psi			

EMU	1	2	3
30. SUIT ΔP: ≤ 0.3 psi			

EMU	1	2	3
42. BATT AMPS: 2.4 to 6.5 amps			

EMU	1	2	3
45. BATT AMPS: 2.4 to 4.0 amps, decrease from 42			
RPM: 19.0 to 20.0 K			
H2O TEMP: decrease from 29			

EMU	1	2	3
49. SOP P: 5410 to 6800 psi			

EMU	1	2	3
50. SOP Gauge: 5400 to 6800 psi			
INT Gauge:			

51. Cab Temp:	
---------------	--

EMU	1	2	3
53. INT Gauge: < 600			
SUIT P: 3.4 to 3.9 psi			

EMU	1	2	3
65. BATT VDC			

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1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2) Page 1 of 8 pages

OBJECTIVE:

Record continuous EMU operating data on to the PCS Laptop harddrive. The recorded data is then transferred via floppy disk to an SSC Laptop for downlink to **MCC-H** and used for detailed analysis of the EMUs function.

NOTE

An SSC DOS formatted floppy disk will be required at the end of the procedure.

1. Unstow the following:
- A/L100 Serial Data Cable (SEG39136003-301) for EMU
 (located in CTB labeled "SPCE Maintenance Kit")
- ISS Tool Box: Static Wrist Tether
Drawer #5

Unstow/transfer PCS with floppy disk drive and floppy disk to Airlock.

NOTE

The PCS floppy drive must be connected to the PCS and then the PCS rebooted in order for the floppy disk drive to be recognized by the PCS. The PCS will be powered up in step 4 after all connections are complete.

- E-Lk 2. Locate PCS in Equipment Lock near EMU.
 Connect floppy disk drive.
3. Remove EMU Serial Data Cable Connector covers.

NOTE

The Serial Data Cable connection to the PCS serial port will be difficult due to the length of the connector retention screws.



Figure 1 - Serial Data Cable Connector with Retention Screws (shown retracted)

- PCS 4. Inspect cable/PCS connectors for damage and debris.
 EMU Serial Data Cable (end labeled "PCS/Serial Port") →|← PCS Serial
 Connector (9-pin) and secure with retention screws.
5. Power on PCS.

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2) Page 2 of 8 pages

* If retention screws are not being used per **MCC-H** direction:
* Pull retention screws diagonally back (Figure 1).
* EMU Serial Data Cable (end labeled "PCS/Serial Port"
* →|← PCS Serial connector (9-pin) without securing
* retention screws.

- EMU 6. Rotate EDDA open.
Unzip thermal cover
Affix cover with Velcro to top of EMU
7. Don static wrist tether and connect to EMU battery attach post in PLSS.
- EMU 8. [CONNECTING SERIAL DATA CABLE TO EMU](#)
(Refer to Figure 2.)
- 8.1 Remove Kapton Tape from EMU "P4" connector, if present.
Place tape in trash. (not required to re-tape connector)
- 8.2 Inspect "P4" and Cable connectors for damage and debris.
EMU Serial Data Cable (end labeled "EMU/CWS Port") →|← "P4"
EMU Connector.
- 8.3 Doff static wrist tether.

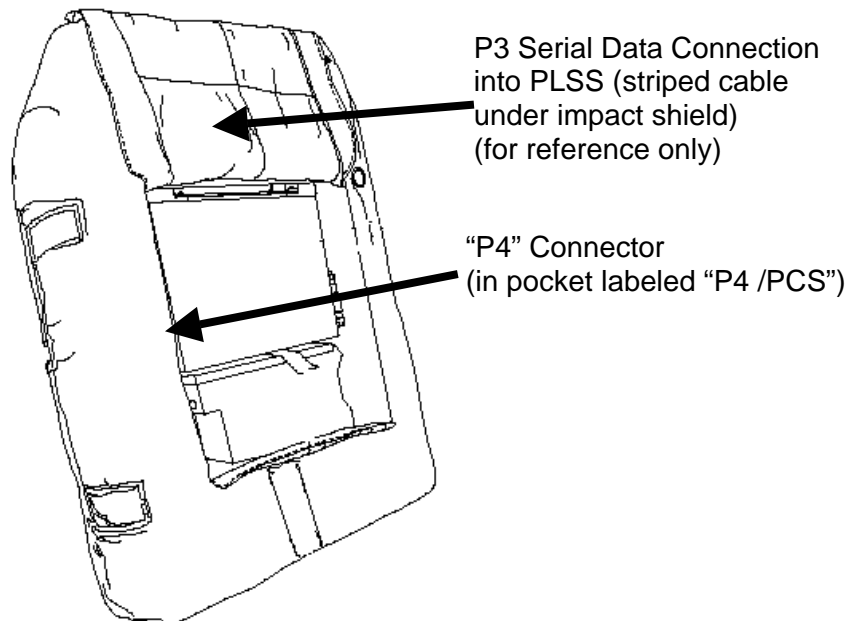


Figure 2.- P4 EMU Serial Data Interface in back of EMU PLSS.

9. Perform [{1.520 EMU POWERUP/POWERDOWN}](#), Powering Up EMUs steps (SODF: ISS EVA SYS: EMU MAINTENANCE) for specified EMU, then:

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2)

Page 3 of 8 pages

10. SETTING COLLECTION TIME AND STARTING EMU LOGGER

NOTE

1. These steps will only be performed if directed by **MCC-H**. These steps change the recording time to 50 minutes (maximum time to allow data transfer by one floppy disk) and will start the EMU Logger. The default "Time Left" for recording data is 15 minutes. After 15 min, the EMU logger will stop recording EMU data onto the PCS harddrive, but the application main display will continue displaying updated parameters.
2. The displayed values for "CO2 Level" and Battery/Oxygen "Time Left" parameters will not be displayed correctly. Raw hex data is correct and recorded.

PCS If directed by **MCC-H**

- 10.1 Left click on arrow above the "Pencil on the Paper" icon to open the **Personal Applications** menu. Click on '**Terminal**' item.

NOTE

PCS keyboard inputs are case/space sensitive, enter typing (upper case, lower case, and spaces) as shown in steps below.

- 10.2 Type "setenv CDS_LOGS /var/opt/PCS/logs"
Press [ENTER]
Type "cd /opt/PCS/EMU_logger/bin"
Press [ENTER]
- 10.3 Type "EMU_logger -time 50"
Press [ENTER] (this will start the logger)
- 10.4 Verify "Time Left 50:00" in first text line is decreasing.
Verify EMU data is being received (not all zeros).
- 10.5 Inform **MCC-H** GMT of logging start.
- 10.6 Go to step 12

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2)

Page 4 of 8 pages

PCS 11. [INITIATING EMU SERIAL DATA COLLECTION](#)

NOTE

1. The EMU logger will automatically begin logging data when the "Start EMU logger" item is selected. The default "Time Left" for recording data is 15 minutes. After 15 minutes, the Logger will stop recording EMU data onto the PCS harddrive, but the application main display will continue displaying updated parameters.
2. The displayed values for "CO2 Level" and battery/oxygen "Time Left" parameters will not be displayed correctly. Raw hex data is correct and recorded.

Left click on arrow above PCS icon for "PCS Software Controls" menu

PCS Software Controls

sel 'Start EMU logger'

EMU_logger

Verify 'Time Left XX:XX' in first text line is decreasing.
Inform **MCC-H** GMT of logging start.

- EMU 12. Perform additional EMU operations during data collection as directed by **MCC-H**.

PCS 13. [TERMINATING DATA COLLECTION AND QUITTING EMU LOGGER](#)

EMU_logger

If 'Time Left' > 00:00 in first text line;
sel Control menu
sel Start/Stop EMU Logging

Verify 'Not Logging' message displayed in first text line (indicating log file complete).

EMU_logger

sel Control menu
sel Exit

Close any remaining EMU Logger windows.

- EMU 14. Perform {1.520 EMU POWERUP/POWERDOWN }, Powering Down EMUs steps (SODF: ISS EVA SYS: EMU MAINTENANCE) for specified EMU, then:

15. Don static wrist tether

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2)

Page 5 of 8 pages

EMU Serial Data Cable (end labeled "EMU/CWS Port") ←|→ "P4" EMU connector

Stow EMU connector in "P4/PCS" pocket in EMU PLSS.

Close thermal cover.

Install cap on Serial Data Cable.

Doff static wrist tether

16. If other EMU serial data required, repeat steps 5 to 15 for other EMU then:

17. COPYING EMU LOG FILES FROM PCS TO FLOPPY

SSC 17.1 ✓ Floppy disk formatted on SSC for use with DOS operating system.

PCS 17.2 Insert disk into PCS floppy drive

- 17.3 Left click on arrow above the "Pencil on the Paper" icon to open the Personal Applications menu. Click on Terminal item.

NOTE

1. PCS keyboard inputs are case/space sensitive, enter typing (upper case and lower case) and spaces as shown in steps below.
2. No command line response expected in step 17.4, but the floppy drive access light should illuminate for several seconds. If no floppy disk is in the drive, no error message will be given.

- 17.4 Type "volcheck" to mount the floppy disk
Press [ENTER]

NOTE

1. PCS automatically saves each EMU log file with the name EMU_log_mm_dd_hh_mm in the directory /var/opt/PCS/logs (mm_dd_hh_mm represent the month, day, hour, and minute the logger file was started).
2. The use of the "previous/" directory depends on how many times the PCS is rebooted. If the PCS has not been rebooted since the log files were created, the log files will be in "/var/opt/PCS/logs/" only. If the PCS has been rebooted once, use "/var/opt/PCS/logs/previous/," if it has been rebooted twice, use "/var/opt/PCS/logs/previous-1/," if three times, use "/previous-2," etc.

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2)

Page 6 of 8 pages

- 17.5 Click on the “File Cabinet icon” to open the File Manager application

File Manager

Click on the folder above the forward slash “/” to go to the root directory.

Click on folders to continue navigation to the “var/opt/PCS/logs” folder.

- 17.6 Highlight “EMU_log_mm_dd_hh_mm” file to be copied (single left click)

File Manager

sel ‘Selected’ menu

sel Copy to....

NOTE

1. The log file names are longer than 8 characters. Since the floppy disk uses DOS naming conventions, the files must be renamed to 8 characters maximum when they are copied to the floppy.
2. EMU_log_mm_dd_hh_mm represents all EMU log files to be renamed to a new file name EMUX where X = 1 or 2 or 3, etc. Also, the EMU_logger.out file will be copied and renamed to the new file name EMU_log.
3. The floppy drive access light will illuminate while the copy is in progress. The copy is complete when the access light turns off. Note any error messages indicating that the disk is full or other error during the copy.

- 17.7 Enter destination folder as “/floppy/floppy0” and new copied file name as “EMUX” as required (where X = 1, 2, 3, etc.)
Click [OK]

- 17.8 Repeat steps 17.6 and 17.7 as required for additional log files

- 17.9 Repeat steps 17.6 and 17.7 for “EMU_logger.out” file with new copied name as EMU_log

If floppy disk is full:

- 17.10 Perform steps 16 and 17, then return to step 15.1 with new floppy.

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2) Page 7 of 8 pages

18. VERIFYING LOG FILES ON FLOPPY DISK

NOTE

A 15 minute log file should be approximately 380 KB and a 50 minute log file about 1.3 MB.

- 18.1 Click on the 'File Cabinet icon' to open a second File Manager application window or Click on the folder above the forward slash "/" to go to the root directory and continue navigation to the "floppy/floppy0" folder

Verify all log files copied and shown on floppy disk with appropriate size .

If file details not displayed in window view:

File Manager

sel View menu
sel Set View Options
sel By name, date, size... (under 'Representation' area)

Click [OK]

- 18.2 Close any File Manager window viewing floppy disk files

19. EJECTING FLOPPY DISK FROM PCS

NOTE

If you have the file manager application viewing the "floppy0" directory, a error message will occur when trying to eject. This message can be closed with no impact.

- 19.1 Make Terminal window from step 15.3 active window
input eject on command line
Press [ENTER]

- 19.2 Click [OK] on pop-up window as shown in Figure 3

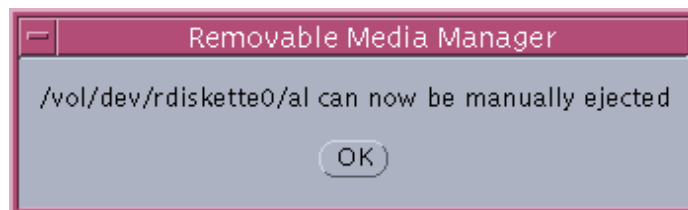


Figure 3. – Floppy Disk Eject Message.

- 19.3 Remove floppy disk from PCS drive by pressing blue eject button

PCS 20. Power off PCS.

1.420 EMU SERIAL DATA RECORDING

(ISS EVA SYS/8A - ALL/FIN 2) Page 8 of 8 pages

21. EMU Serial Data Cable (end labeled "PCS/Serial Port") ←|→ PCS Serial Connector (9-pin)
Install EMU Serial Data Cable Connector covers.
- E-LK 22. Stow EMU Serial Data Cable in SPCE Maintenance Kit CTB (A/L1O0).
Stow PCS (as required).
Stow Static Wrist Tether in ISS Tool Box: Drawer #5.
- SSC 23. Transfer log files from floppy disk to the OPS LAN 'k:\OCA down\EMU' for OCA downlink (EMU folder may need to be created).
24. Inform **MCC-H** when file(s) transfer complete.
- MCC-H** 25. Retrieve log file(s) from OPS LAN directory "k:\OCA-down\EMU".

1.430 SAFER CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 4 pages

I

(30 Minutes)

OBJECTIVE:

Verify the systems on the Simplified Aid for EVA Rescue (SAFER) are functional prior to EVA.

NOTE

Procedure written for simultaneous checkout of two SAFERs.

Both
SAFERs

1. Remove SAFER and SAFER CHECKOUT RESULTS Cue Card from Stowage Bag.
2. ✓Inhibitor installed and secure
3. Remove Stowage Straps from thruster towers.
Unfold thruster towers.
4. Inspect:
Thruster tower hinges
Tower latches
- ✓TMG not blocking thrusters (twenty-four)
5. Fold thruster towers.
6. Install Stowage Straps.
7. MAN Isol Vlv → Op (dn)
8. Deploy HCM.

✓Proper deployment

CAUTION

Minimize time with SAFER powered (~1 minute).

NOTE

1. Have SAFER CHECKOUT RESULTS Cue Card with proper serial number ready to record status.
2. SAFER will be in Automatic Attitude Hold (AAH LED – On) from sw POWER → ON until entry into TEST mode (step 10.3). Prior to taking sw POWER → ON, try to hold SAFER steady against a wall. Changes in SAFER attitude will result in thruster firings.

1.430 SAFER CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 4 pages

- * If display is nonresponsive during self-test
- * | sw DISP → Press, to view failure message
- * | Record message, then:
- * | sw DISP → Press, to resume test

9. As required, review SELF-TEST SEQUENCE.
Refer to Table 1.

Table 1. Self-Test Sequence

SELF-TEST SEQUENCE (FOR REFERENCE ONLY, DO NOT PERFORM)	
HCM	<ol style="list-style-type: none">1. NSI circuit test.2. SELF TEST – WAIT √Twenty-four thruster clicks √THR LED (red) – Blinking3. DEPRESS AAH4. MODE – ROT (if in TRAN) MODE – TRAN5. HC grip detent test.6. HC +X (fwd), [-X, +Y (rt), -Y, +Z (dn), -Z, +P (twist up), -P]7. RATE CHECK Rotate SAFER at least ± 3 deg/sec sequentially in each rotational axis.

10. PERFORMING SELF-TEST

10.1 Start timer.

HCM 10.2 sw PWR → TST/ON

Wait until **GN2 XX% PWR XX%** displayed.

√AAH LED (green) – On

NOTE

When SAFER is first put in Test mode, the thruster check happens quickly. Remember to count thruster clicks (24).

1.430 SAFER CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 3 of 4 pages

- 10.3 sw PWR → ON
sw PWR → TST/ON

- 10.4 Follow displayed instructions on HCM

√ **SELF TEST – WAIT** displayed

If able, count thruster clicks (24).

```
*****
* If NSI CIRCUIT OPEN or FAIL: ... message
* displayed
* Note failure message.
*
* sw DISP → Press to resume test
*
* If HC TO DETENT message displayed
* Note message.
*
* √HC grip springs to center position
*****
```

- 10.5 When **RATE CHECK** displayed
Rotate SAFER at least ± 3 deg/sec sequentially in each rotational axis.

11. √ **GO FOR EVA** or **FAILED TEST** displayed

12. sw PWR → ON

13. √DISP: Record GN2 %, PWR %, BATT V on SAFER CHECKOUT RESULTS Cue Card.

14. sw PWR → OFF

15. Stop timer, record 'ON Time' (~1 minute desired).

16. √GN2 % ≥ 87
√PWR % ≥ 45
√BATT V ≥ 35

17. Report GN2 %, PWR %, BATT V and SAFER serial number to **MCC-H**.

- HCM 18. sw MODE → ROT

CAUTION

Do not stow HCM to be used for EVA with power switch guard installed.

1.430 SAFER CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 4 of 4 pages

NOTE

When stowing HCM, verify that the umbilical will not snag during deployment.

19. Stow HCM.
20. MAN Isol Vlv → CI (up)
21. Stow SAFER and Cue Card in Stowage Bag.
22. ✓ Inhibitor installed and secure

1.445 PSA ACTIVATION AND CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 2 page

I

(15 Minutes)

OBJECTIVE:

Following a removal and replacement of the Power Supply Assembly (PSA), this procedure activates and verifies proper operation of the newly installed PSA.

NOTE

This procedure assumes SCUs are stowed (not connected to EMUs).

PSA POWERUP

PSA 1. √sw IRU/UTILITY PWR – OFF
√sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU 1,2 (two) – PWR

2. sw MAIN POWER → ON

√MAIN POWER LED – On

DISPLAY AND POWER CHANNEL CHECK

Wait 5 seconds until pixel test is complete.

3. √FAULT LED – Off
√No '**FAULT**' messages displayed in STAT row
√No TEMP or WD faults displayed in FLAG column
√Display indications are nominal as shown in Figure 1

	EMU1	ORL1	EMU2	ORL2	IRU	FLAG
VOLT	--	--	--	--	--	--
AMPS	--	--	--	--	--	WD--
STAT	OFF	OFF	OFF	OFF	OFF	

Figure 1.- PSA Nominal Display.

4. sw IRU/UTILITY PWR → ON

√IRU Volts: 27.0 to 29.0

IRU 5. sw POWER → ON

PSA 6. √IRU/UTILITY PWR LED – On
√IRU Volts: 27.0 to 29.0
√IRU Amps: 0.0 to 0.1

IRU 7. sw POWER → OFF

PSA 8. sw SUIT SELECT (two) → ORL1,2

√ORL1,2 LEDs (two) – On
√ORL1,2 Volts: 27.4 to 28.6

9. sw SUIT SELECT (two) → EMU1,2

1.445 PSA ACTIVATION AND CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 2 of 2 page

- √EMU1,2 LEDs (two) – On
- √EMU1,2 Volts: 18.0 to 19.0

UIA 10. sw PWR EV-1,2 (two) → ON

- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS: 18.0 to 19.0

11. sw PWR EV-1,2 (two) → OFF

- √PWR EV-1,2 EMU LEDs (two) – Off

PSA POWERDOWN

PSA 12. sw SUIT SELECT (two) → OFF

- √SUIT SELECT LEDs (four) – Off

13. √sw EMU MODE EMU 1,2 (two) – PWR

14. sw IRU/UTILITY POWER → OFF

- √IRU/UTILITY POWER LED – Off

15. sw MAIN POWER → OFF

- √MAIN POWER LED – Off

16. √Display – blank

EMU MAINTENANCE

	<u>GND</u>	<u>ISS</u>
1.505 EMU WATER RECHARGE	169	169
1.507 EMU WATER MAINTENANCE DUMP AND FILL.....	177	MPV
1.510 METOX REGENERATION	185	185
1.515 EMU METOX/LIOH/BATTERY REPLACEMENT	189	MPV
1.517 METOX CANISTER O-RING CHANGEOUT	191	MPV
1.520 EMU POWERUP/POWERDOWN	193	MPV
1.525 LCVG WATER FILL.....	195	MPV
1.540 HELMET LIGHT BULB CHANGEOUT.....	199	MPV
1.545 EMU BARCODE LOCATION REFERENCE	201	MPV
1.550 EMU RESIZE	203	MPV

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1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 1 of 7 pages

I

(25 Minutes)

(45 Minutes if setting up CWC)

OBJECTIVE:

Recharge EMU feedwater tanks with iodinated water from EMU Water Recharge Bag Payload Water Reservoir (PWR). A small quantity is then dumped from the feedwater tanks to provide ullage for condensate collection during the next EMU prebreathe.

INITIATE (15 MINUTES)

E-Lk 1. Unstow designated EMU Water Recharge Bag (PWR) from floor bin.

CAUTION

PWRs should be inspected for gas bubbles prior to connecting them to the IRU to avoid introducing gas into the EMU feedwater tanks. If a significant quantity of gas is observed, a PWR de-gas may be required.

PWR 2. Unzip restraint bag to access bladder.
Report approximate visual quantity of H₂O and gas bubbles to **MCC-H** as comm permits.
Zip restraint bag closed.

A/L1F2 3. Attach bag to wall below IRU.

IRU 4. EMU Water Recharge Bag →|← H₂O IN Port

5. √H₂O outlet vlv (rotary) – CLOSED

If EMUs not powered

6. POWERING UP EMUS

U1A 6.1 √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√EMU O₂ SUPPLY PRESS gauge: < 950

C-Lk wall 6.2 Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk.

DCM 6.3 Remove DCM cover.
Attach with Velcro to DCM.

6.4 SCU →|← DCM

√SCU locked

6.5 sw POWER → BATT

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 2 of 7 pages

CAUTION

EMU must be on BATT power when UIA suit power is turned on.

PSA

- 6.6 √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU1,2 (two) – PWR

- 6.7 sw MAIN POWER → ON

√MAIN POWER LED – On

- 6.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA

- 6.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM

- 6.10 sw POWER → SCU

UIA

7. √WATER EV-1,2 REG vlv (two) – SUPPLY

8. WATER EV-1,2 SUPPLY vlv (two) → OPEN

If PSA Utility Outlet power being used for other applications

9. Contact **MCC-H** for verification of PSA Utility Outlet power loading.

PSA

10. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU Volts: 27.0 to 29.0

NOTE

1. The following step powers on the IRU.
2. Be prepared to verify the POWER, PRESS, and TEMP LEDs briefly illuminate when IRU POWER is taken ON. As required, notify **MCC-H** of any missing pixels on QUANTITY display.

IRU

11. sw POWER → ON

√POWER, PRESS, TEMP LEDs (three) –On (at startup)

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 3 of 7 pages

When 2.5-second LED and pixel check complete

12. ✓POWER LED remains – On

13. H2O outlet vlv (rotary) ↻ EMU SUPPLY.

14. sw PUMP → ON

✓PUMP LED – On (green)

✓QUANTITY display – ↑

* If TEMP LED or PRESSURE LED – On (yellow)

* | sw PUMP → OFF

*

* | Contact **MCC-H**.

TERMINATE (10 MINUTES)

DCM

15. ✓STATUS: H2O WP

IRU

If H2O WP ≤ 12.0 psi and Quantity display not ↑ (bag empty)

15.1 sw PUMP → OFF

15.2 H2O outlet vlv (rotary) ↻ CLOSED

15.3 Record value from IRU Quantity display in Table 1.
Report bag serial number, Quantity, and empty status to
MCC-H as comm permits.

Table 1. Payload Water Reservoir Content

Date	Bag Serial Number	IRU Quantity	Approx. H2O/Gas Content	
			H2O (L)	Gas (mL)

15.4 EMU Water Recharge Bag ←|→ H2O IN Port

Stow in E-lk Floor Bin.

E-lk

15.5 Unstow new designated EMU Water Recharge Bag.

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 4 of 7 pages

IRU	15.6	Unzip restraint bag to access bladder. Report approximate visual quantity of H2O and gas bubbles to MCC-H as comm permits. Zip restraint bag closed.
	15.7	EMU Water Recharge Bag → ← H2O IN Port
	15.8	Go to step 13.
		When H2O WP > 12.0 psi, stable for ~30 seconds (charging complete)
UIA	16.	WATER EV-1,2 SUPPLY vlv (two) → CLOSE
IRU	17.	sw PUMP → OFF √PUMP LED – Off
	18.	H2O outlet vlv (rotary) ↻ CLOSED.
	19.	Record value from Quantity display on Table 1.
	20.	sw POWER → OFF √POWER LED – Off
	21.	EMU Water Recharge Bag ← → H2O IN Port Unzip restraint and inspect bag for water and gas content. Record on Table 1. Zip restraint bag closed.
	22.	Report bag serial number, IRU Quantity, and approximate visual H2O/gas content to MCC-H as comm permits.
A/L1D1	23.	Stow bag in floor bin. Report new stowage location to MCC-H as comm permits.
PSA		If PSA Utility Outlet power not being used for other applications
	24.	sw IRU/UTILITY POWER → OFF √IRU/UTILITY POWER LED – Off

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 5 of 7 pages

Alternate method to dump to a CWC per **MCC-H**.

25. SETTING UP EMU WASTEWATER COLLECTION BAG (20 minutes)

25.1 Unstow the following:

- ☐ CWC s/n ____ with orange label

ISS IVA Toolbox:

- ☐ Ratchet, 3/8" Drive
- ☐ 6" Extension
- ☐ 5/16" Socket, 3/8" Drive

UIA

25.3 Unfasten captive screws (four) on filter access door using ratchet and 5/16" socket with 6" extension.

CAUTION

UIA Filter access door was not designed to handle kickloads while open. Use caution when translating near it.

25.4 Open filter access door.

NOTE

1. As required, use a towel to clean up any residual water.
2. Refer to Figure 1 for UIA Waste biocide filter location and attachment configuration.

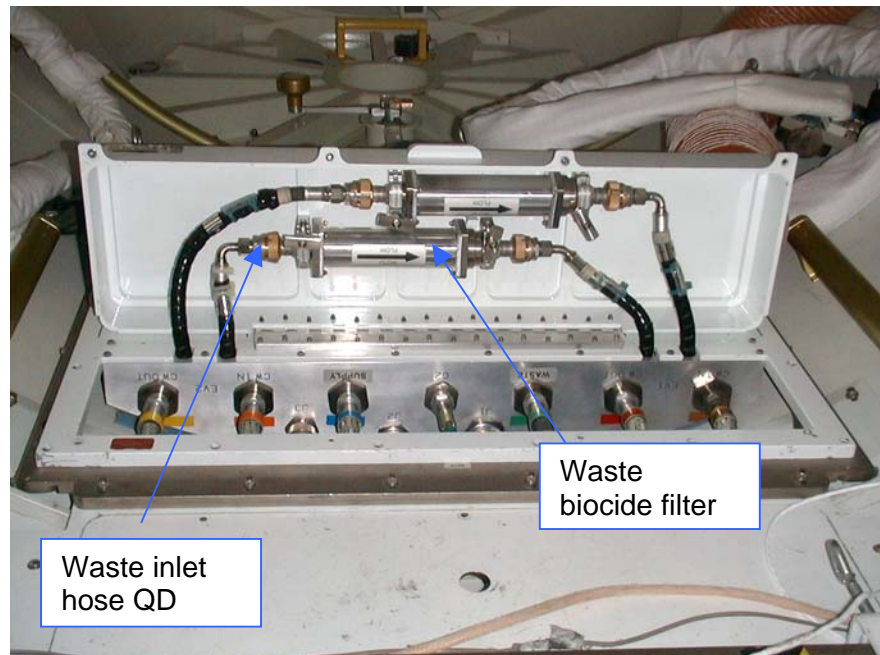


Figure 1.- UIA Filters and Hoses.

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 6 of 7 pages

UIA

25.5 WASTE inlet hose QD ←|→ WASTE biocide filter

25.6 CWC →|← WASTE inlet hose QD

25.7 Perform steps 27 to 33.

25.8 CWC ←|→ WASTE inlet hose QD

25.9 WASTE inlet hose QD →|← WASTE biocide filter

25.10 Close UIA filter access door.

25.11 Fasten captive screws (four) on filter access door using ratchet and 5/16" socket.

25.12 Restow CWC and tools.
Go to step 35.

PCS

26. VERIFYING CONDENSATE TANK CONFIGURATION

Lab: ECLSS: H2O Vent

Lab Water Vent

√Water Vent System Status – Inhibited

If Water Vent System Status – Enabled

√**MCC-H**

√Condensate Tank Qty 1(2) < 42.5 kg

If Condensate Tank Qty 1(2) > 42.5 kg

√**MCC-H**

EMU

27. √Helmet ←|→ HUT

Install SCOF

√SCOF locked

DCM

28. O2 ACT → IV

UIA

29. √WATER EV-1(2) SUPPLY vlv – CLOSE

NOTE

Steps 30 and 31 should be performed serially for EMU 1 and EMU 2.

30. WATER EV-1(2) REG vlv → WASTE

Wait 30 seconds.

1.505 EMU WATER RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 7 of 7 pages

31. WATER EV-1(2) REG vlv → SUPPLY
32. Repeat steps 30 and 31 for other EMU.
- DCM 33. O2 ACT → OFF
34. Verify with **MCC-H** that 0.5 to 1.0 lbm (0.23 to 0.45 kg) per EMU was dumped to condensate tank.
35. Remove SCOF.
Stow SCOF in EMU Equipment Bag.
36. As required per timeline, go to {1.240 POST EVA} (SODF: ISS EVA SYS: EVA PREP/POST).
- or
- Go to {1.525 LCVG WATER FILL} (SODF: ISS EVA SYS: EMU MAINTENANCE).
- or
- Go to step 37.
- DCM 37. POWERING DOWN EMUS (AS REQUIRED)
 - 37.1 √sw POWER – SCU
 - UIA 37.2 sw PWR EV-1,2 (two) → OFF
 - √PWR EV-1,2 LEDs (four) – Off
 - √PWR EV-1,2 VOLTS: ~ 00.0
 - 37.3 OXYGEN EMU 1,2 vlv (two) → CLOSE
 - PSA 37.4 sw SUIT SELECT (two) → OFF
 - √SUIT SELECT LEDs (four) – Off
 - 37.5 sw MAIN POWER → OFF
 - √MAIN POWER LED – Off
 - DCM 37.6 SCU ←|→ DCM
 - 37.7 Install DCM cover.
 - C-lk wall 37.8 Insert SCU in stowage pouch.

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1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 1 of 8 pages

I

(60 Minutes)

OBJECTIVE:

Dump and fill EMU feedwater tanks to satisfy maintenance requirements for on-orbit stowage.

CONFIGURING EMU DATA

MCC-H/IV

1. POWERING UP UHF 1(2) FOR EVA OPERATIONS ON 414.2 MHz

PCS

Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL), or
Perform {2.703 UHF 2 ORU ACTIVATION}, all (SODF: C&T: NOMINAL), then:

EMU WATER DUMP SETUP

2. Unstow the following per the stowage note:

Item
ISS IVA Toolbox: <input type="checkbox"/> Ratchet, 3/8" Drive <input type="checkbox"/> 6" Extension <input type="checkbox"/> 5/16" Socket, 3/8" Drive
<input type="checkbox"/> Towel
<input type="checkbox"/> EMU Water Recharge Bag (PWR sn ____ with white label)
If dumping to CWC: <input type="checkbox"/> CWC sn ____ with orange 'Special Fluids' label
If dumping to PWR: <input type="checkbox"/> Kapton Tape <input type="checkbox"/> Ziplock Bag <input type="checkbox"/> EMU Waste Water Bag (PWR sn ____ with orange label) PWR Vent Hardware: <input type="checkbox"/> Yellow-Red QD Adaptor <input type="checkbox"/> Blue-Blue Hose
<input type="checkbox"/> Egg Timer
EMU Equipment Bag: <input type="checkbox"/> SCOF

PSA

3. $\sqrt{\text{sw}}$ MAIN POWER – OFF

UIA

4. Unfasten captive screws (four) on filter access door using ratchet and 5/16" socket with 6" extension.

CAUTION

UIA Filter access door was not designed to handle kickloads while open. Use caution when translating near it.

5. Open filter access door.

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

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CAUTION

QDs are spring loaded and can be damaged on impact. Use two hands when mating/demating: one hand to depress the silver tabs and the other to retract the gold collar.

NOTE

1. Have towel ready to clean up any residual water.
2. Refer to Figure 1 for UIA Waste biocide filter location.

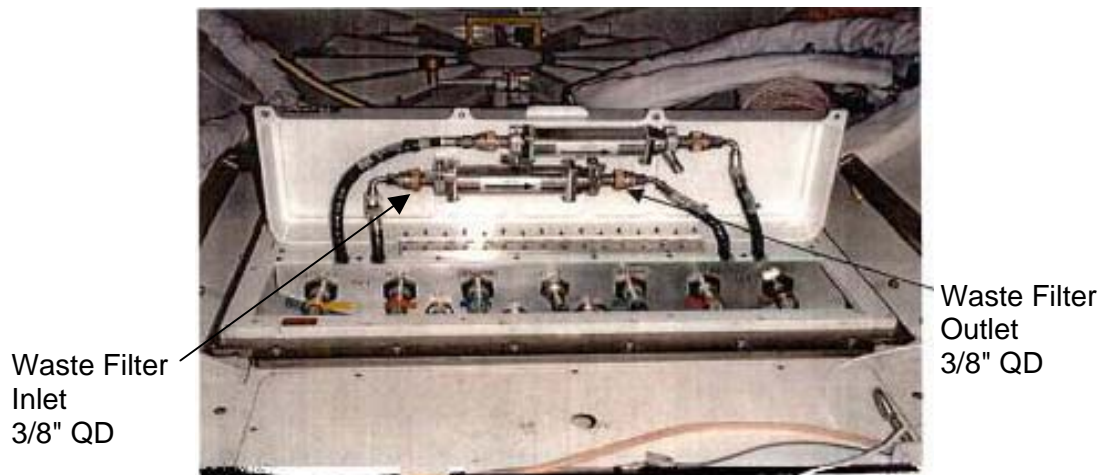


Figure 1.- UIA Biocide Filters.

NOTE

Either step 6 or 7 will be performed per Execution Note or **MCC-H**.

6. CONFIGURING CWC TO COLLECT EMU WASTEWATER

6.1 Waste inlet hose QD ←|→ Waste biocide filter

6.2 CWC →|← Waste inlet hose QD

6.3 ✓ Configuration per Figure 2.



Figure 2.- CWC Connected to Waste Inlet Hose.

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

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UIA

7. ALTERNATE STEPS (PER MCC-H): CONFIGURING PWR TO COLLECT EMU WASTE WATER

- 7.1 Waste outlet hose QD ←|→ Waste biocide filter
- 7.2 Cover Waste outlet hose QD with Ziplock Bag and Kapton tape.
- 7.3 Waste biocide filter outlet →|← Yellow-Red QD Adaptor (yellow side)
- 7.4 Yellow-Red QD Adaptor (red side) →|← Blue-Blue hose
- 7.5 Blue-Blue hose →|← EMU Waste Water Bag (PWR sn ____)
- 7.6 ✓ Configuration per Figure 3.

Red/Yellow
QD Adapter

Blue-Blue
Hose

PWR

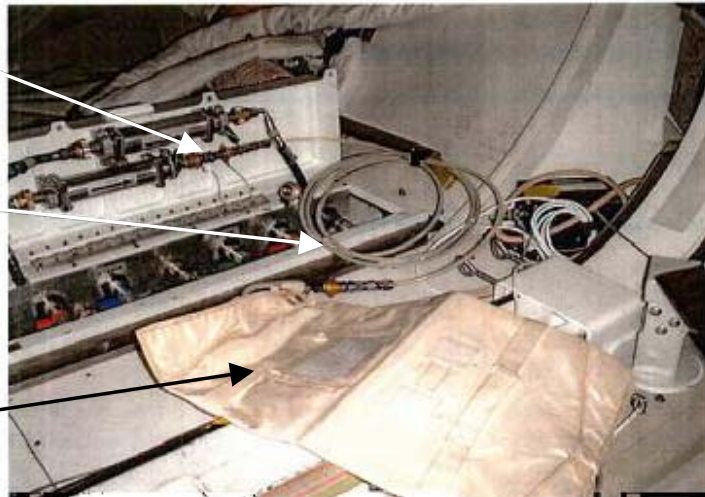


Figure 3.- EMU Waste Water Bag Attachment Configuration.

8. EMU POWERUP

UIA

- 8.1 ✓ sw PWR EV-1,2 (two) – OFF
- ✓ PWR EV-1,2 LEDs (four) – Off
- ✓ EMU O2 SUPPLY PRESS gauge: < 950
- ✓ WATER EV-1,2 SUPPLY vlv (two) – CLOSED
- ✓ WATER EV-1,2 REG vlv (two) – SUPPLY

C-lk wall

- 8.2 Remove EV1(2) SCU from stowage strap and pouch.
Transfer SCU to E-lk.

DCM

- 8.3 Remove DCM cover.
Velcro to DCM.

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 4 of 8 pages

8.4 SCU →|← DCM

√SCU locked

CAUTION

EMU POWER switch must be in the BATT position when
UIA power is turned on.

NOTE

No EMU battery will be installed for this procedure.

8.5 sw POWER → BATT

PSA

8.6 √sw SUIT SELECT (two) – OFF

√sw EMU MODE EMU1,2 (two) – PWR

8.7 sw MAIN POWER → ON

√MAIN POWER LED – On

8.8 sw SUIT SELECT → EMU1(2)

√EMU 1(2) LED – On

√EMU 1(2) volts: 18.0 to 19.0

UIA

8.9 sw PWR EV-1(2) → ON

√PWR EV-1(2) EMU LED – On

DCM

8.10 sw POWER → SCU

8.11 √sw Comm FREQ – LOW

sw COMM mode → PRI

EMU WATER DUMP INITIATE

EMU

9. Helmet ←|→ HUT

10. Install SCOF, √locked

DCM

11. O2 ACT → IV

CAUTION

CWC (or Waste PWR) should be monitored during dump
to ensure that it does not pressurize or overfill.

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 5 of 8 pages

NOTE

1. During the next step, observe flow through the CWC inlet tube (or Blue-Blue hose) for gas bubbles. Report gas bubble flow to **MCC-H**.
2. Expect approximately 20 minutes to complete the water dump.

UIA 12. WATER EV-1(2) REG vlv → WASTE

EMU WATER DUMP TERMINATE

DCM 13. √STATUS: H2O WP

When H2O WP < 7.0 and stable and no bubble flow visible

UIA 14. WATER EV-1(2) REG vlv → SUPPLY

DCM 15. O2 ACT → OFF

EMU WATER RECHARGE INTIATE

A/L1F2 16. Attach EMU Water Recharge Bag (PWR sn ____) to wall below IRU.

IRU 17. EMU Water Recharge Bag →|← H2O IN port

18. √H2O outlet vlv (rotary) – CLOSED

UIA 19. √WATER EV-1,2 REG vlv (two) – SUPPLY

20. WATER EV-1(2) SUPPLY vlv → OPEN

PSA 21. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU volts: 27.0 to 29.0

NOTE

1. The following step powers on the IRU.
2. Be prepared to verify POWER, PRESS, and TEMP LEDs briefly illuminate when IRU POWER is taken ON.
3. Expect approximately 15 minutes to recharge the EMU water tanks.

IRU 22. sw POWER → ON

√POWER, PRESS, TEMP LEDs (three) – On (for 2.5 seconds at startup)

After 2.5 second LED test

23. √POWER LED – On

√PRESS, TEMP LEDs (two) – Off

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

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24. H2O outlet vlv (rotary) ↶ EMU SUPPLY

25. sw PUMP → ON

√PUMP LED – On

26. √QUANTITY display – ↑

```
*****
* If TEMP or PRESS LED – On
* |   sw PUMP → OFF
* |
* |   Contact MCC-H.
*****
```

EMU WATER RECHARGE TERMINATE

DCM 27. √STATUS: H2O WP

If H2O WP > 12.0 and stable for 30 seconds (charging complete)

28. Go to step 35.

If H2O WP ≤ 12.0 and IRU QUANTITY display not ↑ (bag empty)

IRU 29. sw PUMP → OFF

30. Record value from QUANTITY display: _____ lbm.
Report EMU Water Recharge Bag serial number, quantity, and
“empty” status to **MCC-H** as comm permits.

31. EMU Water Recharge Bag ←|→ H2O IN port
Stow in E-1k Floor bin (A/L1D1).

A/L1D1 32. Unstow new designated EMU Water Recharge Bag (sn _____).
A/L1F2 Attach to wall below IRU.

33. EMU Water Recharge Bag (sn _____) →|← H2O IN port

34. Go to step 25.

UIA 35. WATER EV-1(2) SUPPLY vlv → CLOSE

IRU 36. sw PUMP → OFF

√PUMP LED – Off

37. H2O outlet vlv (rotary) ↷ CLOSED

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

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38. Record value from QUANTITY display: _____ lbm.
Report EMU Water Recharge Bag serial number, quantity, and approximate visual quantity remaining to **MCC-H** as comm permits.

39. sw POWER → OFF

√POWER LED – Off

40. EMU Water Recharge Bag ←|→ H2O IN port

- PSA 41. sw IRU/UTILITY POWER → OFF

√IRU/UTILITY POWER LED – Off

- DCM 42. O2 ACT → IV

- UIA 43. √WATER EV-1(2) SUPPLY vlv – CLOSED

NOTE

Be prepared to start a 30-second timer for the ullage dump.

44. WATER EV-1(2) REG vlv → WASTE, start timer
Wait 30 seconds.

45. WATER EV-1(2) REG vlv → SUPPLY

- DCM 46. O2 ACT → OFF

NOTE

Either step 47 or 48 will be performed per Execution Note or **MCC-H**.

47. DECONFIGURING CWC

- UIA 47.1 CWC ←|→ Waste inlet hose QD

- 47.2 Waste inlet hose QD →|← Waste biocide filter

48. ALTERNATE STEPS (PER **MCC-H**): DECONFIGURING WASTE PWR HARDWARE

- UIA 48.2 EMU Waste Water Bag (sn _____) ←|→ Blue-Blue hose

- 48.3 Yellow-Red QD Adapter ←|→ Waste biocide filter

- 48.4 Remove Ziplock Bag from Waste outlet hose.

- 48.5 Waste biocide filter →|← Waste outlet hose
√Silver tabs – locked

- 48.6 Blue-Blue hose ←|→ Yellow-Red QD Adapter

1.507 EMU WATER MAINTENANCE DUMP AND FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 8 of 8 pages

49. Close UIA filter access door.

50. Fasten captive screws (four) on filter access door using ratchet and 5/16" socket.

EMU 51. Remove SCOF.

CLEANUP/DECONFIGURATION

52. EMU POWERDOWN

DCM 52.1 sw COMM mode → OFF

52.2 √sw POWER – SCU

UIA 52.3 sw PWR EV-1(2) → OFF

√PWR EV-1,2 LEDs (four) – Off

√PWR EV-1,2 VOLTS: ~00.0

PSA 52.4 sw SUIT SELECT EMU 1(2) → OFF

√SUIT SELECT LEDs (four) – Off

52.5 sw MAIN POWER → OFF

√MAIN POWER LED – Off

DCM 52.6 SCU ←|→ DCM

Install DCM cover.

C-lk wall 52.7 Insert SCU into stowage pouch.

53. Restow items per stowage note.

54. Dispose of towel as required.

DECONFIGURING EMU DATA

MCC-H/IV 55. POWERING DOWN UHF 1(2) FOR EVA OPERATIONS ON 414.2 MHZ

PCS Perform {2.702 UHF 1 ORU DEACTIVATION}, all (SODF: C&T: NOMINAL), or
Go to {2.704 UHF 2 ORU DEACTIVATION}, all (SODF: C&T: NOMINAL).

1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 1 of 4 pages

OBJECTIVE:

Regenerate Metal Oxide (Metox) Canisters by baking out CO₂ in Metox Regenerator Oven.

(10 Minutes for Initiate)

(10 Minutes for Terminate)

(14 Hour Total Regeneration Time)

CAUTION

If air quality anomaly or unusual smell is present, Metox regeneration should not be performed.

1. INITIATE (10 MINUTES)

MCC-H

1.1 Configuring LTL and Airlock CCAA to Support METOX REGEN

1.1.1 To set the desired LTL temperature setpoint to 7.7° C or less as required (8.3° C desired minus 0.6° C measurement error), perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

1.1.2 For the Airlock CCAA, perform {2.503 CCAA FAN SPEED CHANGE}, steps 1.3 to 1.5 (SODF: ECLSS: NOMINAL: THC), then:

In step 1.4, set the fan speed to 5500 rpm.

In step 1.5, set the temperature to 18° C.

When TCCV position < 13 deg, proceed.

1.1.3 To set the Airlock CCAA fan speed to 3400 rpm, perform {2.503 CCAA FAN SPEED CHANGE}, step 2 (SODF: ECLSS: NOMINAL: THC), then:

1.1.4 C&W Summ

Caution & Warning Summary
'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 7 0 3 (AL1A1 CCAA INOPERATIVE-A/L)

cmd Execute

1.2 Open CO₂ Removal Receptacle Door.

CO₂ VALVE → REGEN

CO₂

Removal

Receptacle

1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 2 of 4 pages

Metox
Regen

1.3 ✓sw POWER – OFF

✓ON LED – Off

1.4 Open regenerator door > 90°.

✓No Metox Canisters stowed in regenerator

If regenerating single Metox Canister

1.5 Install shutoff caps over ports in upper berth (pull out and twist).

1.6 Report Metox Canister barcode and new location to **MCC-H** as comm permits.

Install expended Metox Canister in lower berth per label on Canister.

Go to step 1.8.

1.7 Report Metox Canister barcode and new location to **MCC-H** as comm permits.

Install expended Metox Canisters per label on Canister.

NOTE

The CYCLE switch must be set to START within 15 minutes of closing the regenerator door to avoid resetting the regenerator to the cooldown mode.

1.8 Close regenerator door.

Lock regenerator door handle.

1.9 sw POWER → ON/RESET

Verify all LEDs (19) – On (during startup)

Verify TIME REMAINING display – ↓ (hexidecimally from 'F:FF' to '0:00') and no LCD characters missing

When display countdown and LED check complete

1.10 ✓ON LED – On
✓sw MODE – REGENERATE
✓sw FAULT OVERRIDE – OFF
✓FAULT OVERRIDE ON LED – Off
✓TIME REMAINING display: '0:00'
✓POWER INTERRUPT LED – Off

NOTE

A faint heater-like smell is expected during regeneration.

1.11 sw CYCLE → START

1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 3 of 4 pages

- * If unusual smell or air quality anomaly during regeneration
- * | sw CYCLE → SHUTDOWN
- *
- * | Contact **MCC-H**.

NOTE

During single Canister regeneration, the UPPER CAN FAULT INDICATOR LED will be illuminated.

1.12 ✓ FAULT INDICATOR LEDs (eight) – Off

If VALVE/DOOR FAULT INDICATOR LED (yellow) – On and TIME REMAINING display: '**E:02**'

1.13 Open regenerator door > 90°.

1.14 Close regenerator door.
Lock regenerator door handle.

1.15 Return to step 1.11.

1.16 ✓ REGENERATE HEATING LED – On

✓ TIME REMAINING display: '**14:00**'

✓ TIME REMAINING display – ↓ (1-minute increments)

1.17 If any unexpected errors or faults occur during regeneration, refer to {[2.235 METOX REGENERATOR TROUBLESHOOTING](#)} (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY) and contact **MCC-H**.

2. [TERMINATE \(10 MINUTES\)](#)

When 14 hour regeneration cycle complete or per **MCC-H** instruction:

CAUTION

Metox Canisters should not be left in oven after regeneration.

Metox
Regen

2.1 ✓ REGENERATE COOLING LED – Off

✓ REGENERATE COMPLETE LED – On

✓ TIME REMAINING display: '**0:00**' and no error codes present

✓ OVEN HOT LED – Off

✓ FAULT INDICATOR LEDs (eight) – Off

2.2 Open regenerator door.

2.3 Remove Metox Canister(s).

1.510 METOX REGENERATION

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 4 of 4 pages

NOTE

The regenerator has a known failure mode in which the Metox state indicator may not reset to "R". **MCC** tracks canister status.

2.4 Close regenerator door.

2.5 sw POWER → OFF

2.6 Unstow Metox Canister caps from EMU Equipment Bag.
Install caps on regenerated Canisters.
Stow regenerated Canisters.

2.7 Report Metox Canister barcode and new stowage location to **MCC-H**, as communication permits.

CO2
Removal
Receptacle

2.8 Open CO2 Removal Receptacle Door.

CO2 VALVE → REMOVAL

MCC-H
IV PCS

2.9 Configuring LTL and Airlock CCAA for Nominal Operations
To set the LTL Temperature Setpoint to 11.1° C or less as required, perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

For the Airlock CCAA to set the Temperature Setpoint to 25° C (or per crew preference), go to {2.501 CABIN TEMPERATURE CONTROL}, all (SODF: ECLSS: NOMINAL: THC).

2.10 Returning C&W to Nominal Configuration

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Suppress

Suppress an Event

input Event Code – 6 7 0 3 (AL1A1 CCAA INOPERATIVE-A/L)

cmd Arm

cmd Execute

1.515 EMU METOX/LIOH/BATTERY REPLACEMENT

(ISS EVA SYS/9A - ALL/FIN 3) Page 1 of 2 pages

(20 minutes)

OBJECTIVE:

Replace Metox or LiOH canister and/or battery from EMU.

NOTE

1. Use care when handling/stowing battery to avoid damaging aluminum cover.
2. Limit exposure time of uncapped canister ports and avoid contact with seals.

1. As required, unstow new Metox (LiOH) canisters and EMU Batteries designated by **MCC-H**.

PLSS

2. Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro.
3. As required, remove used Metox (LiOH) or vent port plugs.
For LiOH, mark used canister with tape.

If EMU Battery to be replaced

UIA

4. sw PWR EV-1,2 (two) → OFF

DCM

5. ✓sw POWER – SCU

PLSS

6. Remove used Battery.

7. Install new Battery.

✓Connector alignment

8. Engage latch.

If installing LiOH

While holding new canister with silver plate label facing self

9. Remove caps from new LiOH canister (left first).

Verify LiOH canister O-Seals not damaged.

10. Install canister in EMU (attach Velcro Strap).
Latch canister in place.

If installing Metox

11. Remove caps from new Metox canister.
Verify Metox canister O-Seals not damaged.

12. Install Metox using label on canister for proper orientation.
Latch canister in place.

1.515 EMU METOX/LIOH/BATTERY REPLACEMENT

(ISS EVA SYS/9A - ALL/FIN 3) Page 2 of 2 pages

If not installing a Metox or LiOH

13. Install vent port plugs.

14. If preparing for entry, install vent port plug locking clips.

15. Report Metox (LiOH) and EMU Battery barcodes to **MCC-H**, as communication permits.

PLSS 16. Close thermal cover zipper.

17. Place caps on used Metox or LiOH canisters.
Temporarily stow used canisters and batteries.

1.517 METOX CANISTER O-RING CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 1 page

(10 Minutes)

OBJECTIVE:

Replace Metox canister inlet and outlet port O-Rings.

M-02 Bag

1. Unstow designated Metox canister(s), EMU Servicing Kit.

EMU ORU
Tool Kit

Unstow plastic O-Ring Extraction Tool.

2. Remove Metox canister caps.
Temporarily stow caps.
3. Remove old O-Rings (two) from canister using plastic O-Ring Extraction Tool (do not use metal objects).

Stow O-Rings in trash.

NOTE

Only Metox canister O-Rings, which are orange in color, can be used. LiOH canister O-Rings (blue) are not rated for this application.

4. Unstow new Metox canister O-Rings (two, orange) from EMU Servicing Kit.
5. Install new O-Rings on Metox canister inlet/outlet ports using a rolling motion until O-Rings are fully seated in groove.
6. Install canister caps.
7. Report Metox canister barcode to **MCC-H** as comm permits.

M-02 Bag

8. Stow Metox canister, EMU Servicing Kit.

EMU ORU
Tool Kit

Stow plastic O-Ring Extraction Tool.

NOTE

An EMU leak check must be performed prior to this Metox canister being used for EVA.

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1.520 EMU POWERUP/POWERDOWN

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 1 of 2 pages

I

(5 Minutes for Powerup)
(5 Minutes for Powerdown)

OBJECTIVE:

Simultaneous powerup or powerdown of two EMUs.

NOTE

PWR RESTART message occurs and BITE light is illuminated whenever EMU power is cycled.

POWERING UP EMUs (5 MINUTES)

- UIA
1. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: < 950
- C-Lk
wall
2. Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk.
- DCM
3. Remove DCM cover.
Velcro to DCM.
 4. SCU →|← DCM

√SCU locked
 5. sw POWER → BATT
- CAUTION**

EMU must be on BATT power when UIA suit power is turned on.
- PSA
6. √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU1,2 (two) – PWR
 7. sw MAIN POWER → ON

√MAIN POWER LED – On
 8. sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On
√EMU 1,2 Volts: 18.0 to 19.0
- UIA
9. sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On
- DCM
10. sw POWER → SCU

1.520 EMU POWERUP/POWERDOWN

(ISS EVA SYS/7A - ALL/FIN 3/HC)

Page 2 of 2 pages

POWERING DOWN EMUs (5 MINUTES)

When EMU power no longer desired

- | | |
|--------------|--------------------------------------|
| EV1,2 DCM | 11. √sw POWER – SCU |
| UJA | 12. sw PWR EV-1,2 (two) → OFF |
| | √PWR EV-1,2 LEDs (four) – Off |
| | √PWR EV-1,2 VOLTS: ~00.0 |
| | 13. OXYGEN EMU 1,2 vlv (two) → CLOSE |
| PSA | 14. sw SUIT SELECT (two) → OFF |
| | √SUIT SELECT LEDs (four) – Off |
| | 15. sw MAIN POWER → OFF |
| | √MAIN POWER LED – Off |
| DCM | 16. SCU ← → DCM |
| | 17. Install DCM cover. |
| C-Lk
wall | 18. Insert SCU in Stowage Pouch. |

1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 1 of 3 pages

I

(40 Minutes)

OBJECTIVE:

Fill empty LCVGs with water for EMU crewmember cooling.

1. POWERING UP EMUs

If EMUs not powered

- | | | |
|-----------|------|--|
| UIA | 1.1 | √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: < 950 |
| C-Lk wall | 1.2 | Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk. |
| DCM | 1.3 | Remove DCM cover.
Velcro to DCM. |
| | 1.4 | SCU → ← DCM

√SCU locked |
| | 1.5 | sw POWER → BATT |
| | | <div style="border: 1px solid black; padding: 5px; text-align: center;">CAUTION
EMU must be on BATT power when
UIA suit power is turned on.</div> |
| PSA | 1.6 | √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU1,2 (two) – PWR |
| | 1.7 | sw MAIN POWER → ON

√MAIN POWER LED – On |
| | 1.8 | sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On
√EMU 1,2 Volts: 18.0 to 19.0 |
| UIA | 1.9 | sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On |
| DCM | 1.10 | sw POWER → SCU |

FILLING LCVG WITH EMU FEEDWATER (15 MINUTES)

2. Waist Ring ←|→ HUT
Temporarily stow LTA.
Remove Multiple Water Connector cover.

1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 2 of 3 pages

3. Dry LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

4. Helmet ←|→ HUT
Temporarily stow helmet.

5. Install SCOF.

- DCM 6. Temp control vlv → 7

7. √STATUS: H2O TEMP = ambient

Record H2O TEMP.

EMU	H2O TEMP

8. sw FAN → ON

9. O2 ACT → IV, (expect NO VENT FLOW message, sw DISP → PRO)

10. Wait 30 seconds, then:

10.1 Depress and hold pump priming valve on back of EMU (30 seconds minimum).

10.2 Slowly cycle Temp Control Valve through full range, returning to 7 position.

NOTE

A decrease in H2O TEMP may not be seen if EMU cooling loop was circulating prior to this procedure.

- DCM 11. √STATUS: H2O TEMP decrease from step 8

Record H2O TEMP.

EMU	H2O TEMP

12. Verify air bubbles visible and mobile in LCVG lines.
Verify no unusual fan noise present.

1.525 LCVG WATER FILL

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 3 of 3 pages

If no H2O TEMP decrease or no H2O flow detected in LCVG or if an unusual fan noise is present

13. Slowly cycle Temp Control Valve through full range, returning to 7 position.
14. Depress and hold pump priming valve on back of EMU (30 seconds minimum).
15. Repeat steps 13 and 14 during fill as required.

When no air bubbles visible in LCVG lines

- DCM
16. sw FAN → OFF
 17. O2 ACT → OFF

REFILLING EMU FEEDWATER (25 MINUTES)

18. Perform {1.505 EMU WATER RECHARGE}, all (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

- HUT
19. √SCOF removed
Install helmet.
 20. LCVG ←|→ Multiple Water Connector
Stow LCVG in HUT.
Install Multiple Water Connector cover.

21. Waist Ring →|← HUT

22. POWERING DOWN EMUs

When EMU power no longer desired

- | | |
|-----------|--|
| DCM | 22.1 √sw POWER – SCU |
| UIA | 22.2 sw PWR EV-1,2 (two) → OFF
√PWR EV-1,2 LEDs (four) – Off
√PWR EV-1,2 VOLTS: ~ 00.0 |
| | 22.3 OXYGEN EMU 1,2 vlv (two) → CLOSE |
| PSA | 22.4 sw SUIT SELECT (two) → OFF
√SUIT SELECT LEDs (four) – Off |
| | 22.5 sw MAIN POWER → OFF
√MAIN POWER LED – Off |
| DCM | 22.6 SCU ← → DCM |
| | 22.7 Install DCM cover. |
| C-lk wall | 22.8 Insert SCU in stowage pouch. |

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1.540 HELMET LIGHT BULB CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 2 pages

I

(15 Minutes)

OBJECTIVE:

Replace a burnt-out helmet light bulb with a new one.

NOTE

1. Light assembly has several loose pieces which may be spring loaded. Be prepared to capture them during changeout.
2. Refer to Figure 1 for parts nomenclature.

CAUTION

Handle bulbs with care. Do not touch bulb with bare hands (could degrade bulb life span).

1. Remove helmet light battery from affected side of lights.
Temporarily stow.
2. Don Comfort Glove.
- A/L100 3. Obtain spare Flood Bulb or Spot Bulb/Reflector Assembly from 0.5 CTB labeled SPCE Maintenance Kit.
4. Depress Faceplate.
Open Faceplate Sliders (two) on affected side of lights.
5. Remove Faceplate.
Remove Reflector Housing by pulling straight out.
6. Remove affected bulbs as required.
Stow used bulb in trash.
7. Install new bulb.
Log new stowage location for bulbs in IMS.

NOTE

Contacts on Spot Bulb may be difficult to reseal fully into socket.

8. Install Reflector Housing, seat Spot Bulb/Reflector Assembly.
9. Install Faceplate.
Lock Sliders (two).
10. Install helmet light battery.
Verify helmet light is operational.
11. Stow Comfort Glove.

1.540 HELMET LIGHT BULB CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 2 pages

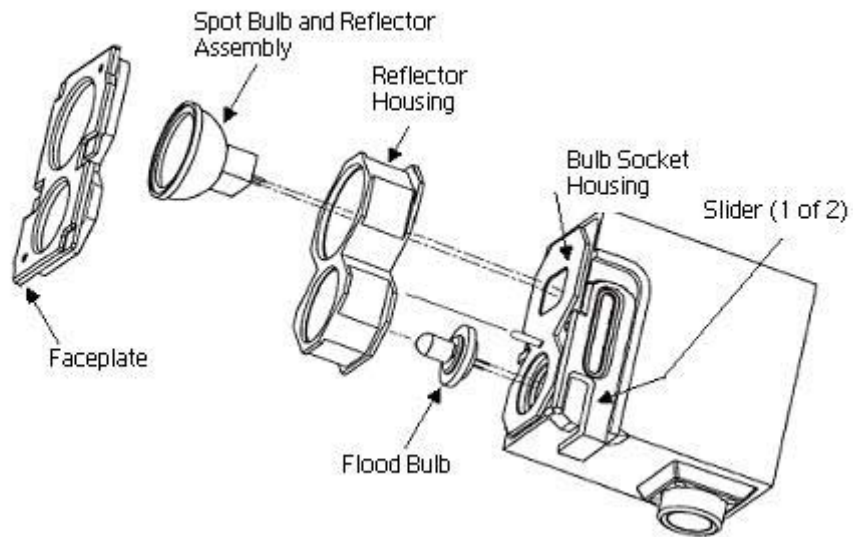


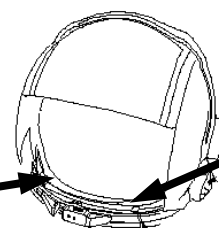
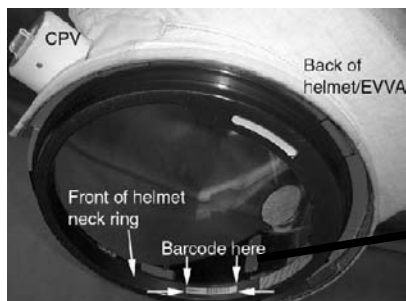
Figure 1.- Helmet Light Bulb Changeout.

1.545 EMU BARCODE LOCATION REFERENCE

(ISS EVA SYS/8A - ALL/FIN 2) Page 1 of 2 pages

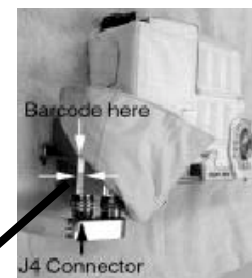
I

HELMET, SHORT EMU (SEMU), AND GLOVES

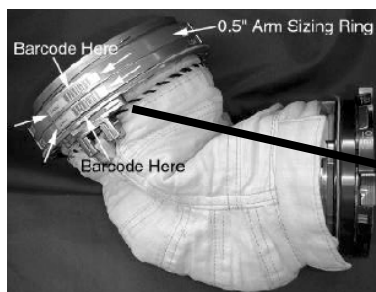


Helmet

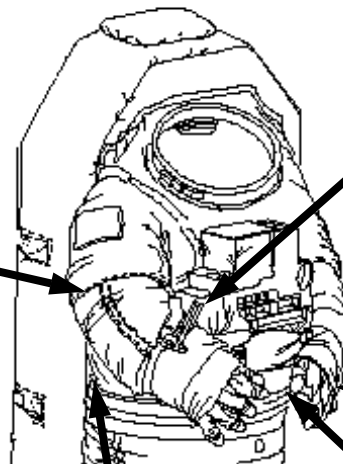
Helmet/EVVA **S/N 10XX**
P/N xxxxxxxxxxxxxxxxx
CREW IDENTIFIER



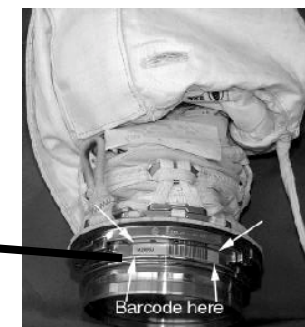
DCM



Arm Sizing Ring / Lower Arm

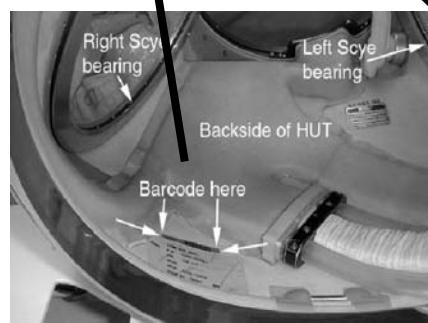


SEMU



Gloves

NOTE
See next page for PLSS barcode location.



HUT

SHORT EMU
P/N xxxxxxxxxxxxx
S/N 30XX

Short EMU (SEMU) Serial Number
(under waist ring TMG cover)

201

1.545 EMU BARCODE LOCATION REFERENCE

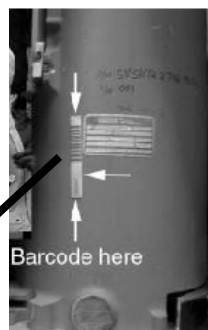
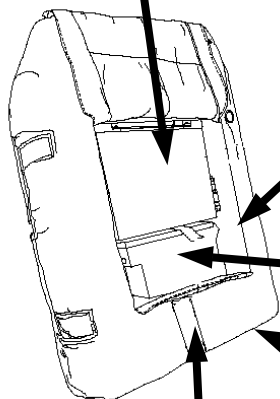
(ISS EVA SYS/8A - ALL/FIN 2)

Page 2 of 2 pages

LTA, PLSS, SOP, METOX (LiOH), REBA, EMU BATTERY, LCVG

202

Metox (LiOH)
(faces out when installed)



PLSS
(back of right O2 tank housing)



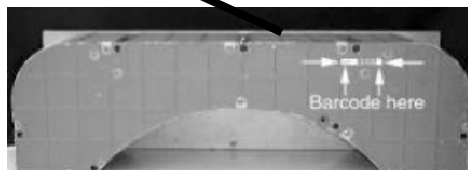
LCVG
(inside of Multiple
Water Connector)



EMU Battery
(faces out when installed)



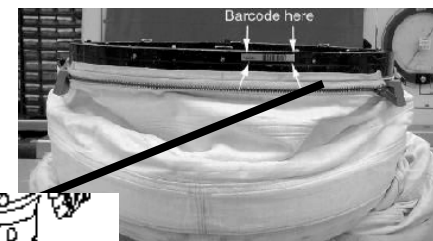
REBA
(inside TMG)



SOP



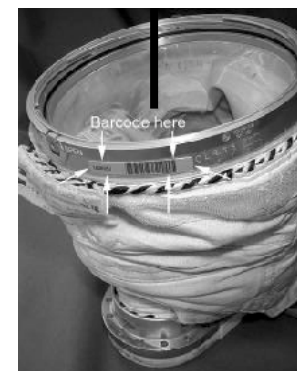
LTA



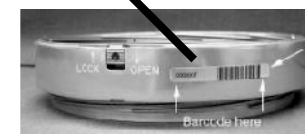
Waist/Brief
(backside)



Thigh Sizing Ring/
Leg Segment



Boot (backside)



Leg Sizing Ring

22 APR 04

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1.550 EMU RESIZE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 5 pages

I

(30 Minutes)

OBJECTIVE:

Adjust the length of EMU suit arms, legs, and/or waist brief.

NOTE

1. Procedures written for arm, thigh, and leg disconnects. Arm, thigh, and leg sizing rings are not interchangeable and cannot be stacked.
2. Figures at the end of the procedure may be used for reference.

1. Identify component(s) to be installed per NOMINAL EMU SIZE MATRIX or CONTINGENCY EMU RESIZE MATRIX.

Old
Components/
EMU

2. Peel back TMG from disconnect.

If replacing arm components

3. ✓sw REBA – OFF

4. Lower Arm Power Harness ←|→ Gloves and Upper Arm

WARNING

Threads on sizing rings and arm/leg/boot segments have sharp edges. Avoid contact with skin and suit bladder.

5. Lock 1 → OPEN (lock may reengage due to bladder on arm)
6. Lock 2 → hold OPEN while turning ring to engage lock 2 OPEN against disconnect
7. Lock 3 → hold OPEN while turning ring in OPEN direction
8. Demate segment/ring.
9. Install protective caps on segment.
10. Stow rings in protective pouches.
11. Repeat steps 2 to 10 as required.



New

Components

12. Verify proper size located on bladder by disconnect. Inspect all seals and threads and wipe with lint-free wipe (EMU Servicing Kit).

1.550 EMU RESIZE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 5 pages

13. Lock 1 → OPEN (lock may reengage due to bladder on arm)
14. Align new component yellow hash marks with yellow bar on disconnect.
15. Turn rings in LOCK direction.
16. ✓ Locks 2,3 – LOCK
17. Lock 1 → LOCK
18. ✓ Cam adjustments (four per segment) per NOMINAL EMU SIZE MATRIX or CONTINGENCY EMU RESIZE MATRIX

If arm components replaced

19. Lower arm power harness → | ← upper arm
20. Remate TMG covering disconnect.
21. Repeat steps 12 to 20 as required.
- Old Components/ EMU 22. Stow replaced component(s).
As required, update IMS locations for replaced component(s).
23. As required, rescan the following EMU components to update IMS
PLSS
EMU Battery
Metox CCC
Helmet (remove, scan, reinstall)
Arm rings (two, if applicable)
Lower arm segments (two)
Gloves (two)
Waist brief (remove, scan, reinstall)
Thigh rings (two, if applicable)
Leg segments (two)
Leg rings (two, if applicable)
Boots (two)

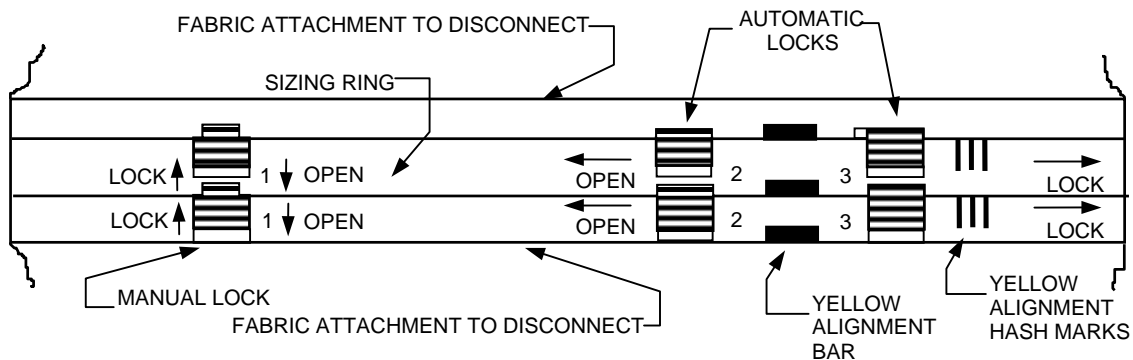


Figure 1.- Disconnect in Locked Position.

1.550 EMU RESIZE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 3 of 5 pages

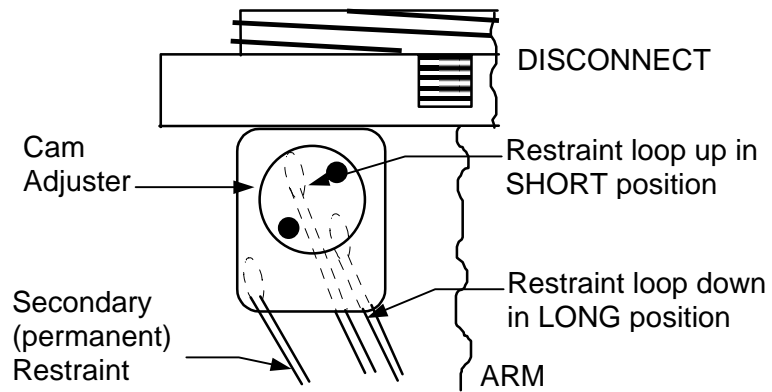


Figure 2.- Arm Cam Adjustment (0.25 inch per cam).

NOTE

1. Cam Adjuster rotates in only one direction.
2. Cam Adjuster should click and lock in the full SHORT and full LONG positions.
3. Cam positions/arms must be symmetric; likely minimum of four cams to be adjusted.

1.550 EMU RESIZE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 4 of 5 pages

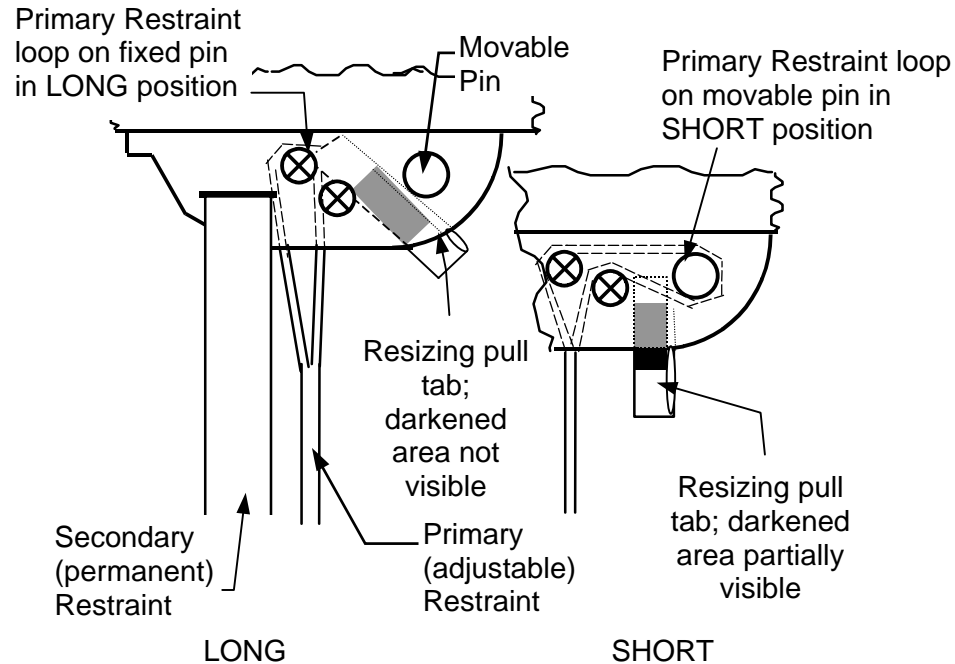


Figure 3.- Waist Cam Adjustment (1.0 inch per cam).

NOTE

1. After adjusting, verify restraint is routed around proper pin; material is not damaged, twisted, or pinched; and the movable pin is fully inserted.
2. With restraint in LONG position, the darkened area on resizing pull tab should not be easily visible.
3. With restraint in SHORT position, the darkened area on resizing pull tab should be easily visible.
4. Cam positions must be symmetric; minimum of two cams to be adjusted.

1.550 EMU RESIZE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 5 of 5 pages

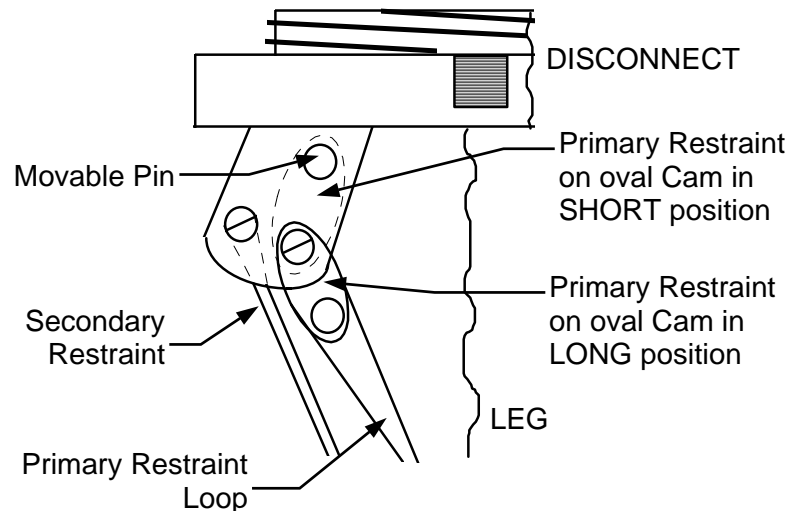


Figure 4.- Leg Cam Adjustment (0.5 inch per cam).

NOTE

1. After adjusting, verify restraint is routed around the oval cam; material is not damaged, twisted, or pinched; and the movable pin is fully inserted.
2. Cam positions/legs must be symmetric; likely minimum of four cams to be adjusted.

CAUTION

1. In SHORT position, the movable pin must be inserted through oval cam, not just through the restraint loop.
2. In LONG position, the restraint must not be around the movable pin. Verify oval cam and restraint are down.

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BATTERY OPS

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BATTERY OPS

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1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS)

Page 1 of 4 pages

(20 Minutes for Initiate)
(10 Minutes for Terminate)

OBJECTIVE:

Recharge EMU, REBA, Helmet Light (HL), and/or PGT batteries in the Battery Stowage Assembly via the Battery Charger Assembly.

CAUTION

Verify that the GSE protective tape has been removed from the battery connectors before installation in BSA. If found, tape should be discarded.

INITIATE (20 MINUTES)

- BSA
1. Open BSA door.
As required, install or remove EMU, HL, and/or PGT batteries per **MCC-H** direction.
 2. Close BSA door.
- If charging REBA(s)
- E-Lk
- BSA
- EMU1,2
3. Unstow REBA/BSA cable from M0-2 Bag.
 4. REBA/BSA Cable →|← AUX CHARGE PORT
 5. Deploy and demate REBA Jumper Cables.
 6. REBA Jumper Cables (one per REBA) →|← REBA/BSA Cable
- BCA
7. sw MAIN POWER (up to four) → ON
√MAIN POWER LEDs (up to four) – On
 8. Wait 20 seconds until pixel test is complete.

√Display readable and CHARGE column reads:

CH: --
V: ----
A: ----

NOTE

1. Do not activate BC switches when hourglass is displayed.
2. MODE (middle) and DATA (right) switches are not labeled on each BC.

1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 2 of 4 pages

9. sw MODE (up to four) → STOP

```
*****
* If display garbled/blank or 'Look At' message on
* | any display
* |   On affected BC, sw MAIN POWER → OFF
* |
* |   Repeat steps 7 to 9 on affected BC.
*****
```

BCA If charging EMU batteries (BC3 Ch4 and BC4 Ch4)
10. Report voltage(s) to **MCC-H**.

11. VERIFYING INITIAL CHANNEL PROFILE

If PCS available

PCS 11.1 Airlock: EVA: Airlock Systems: Battery Charger Assembly
(BCA)
BCA

11.2 √Status – No History (for all channels)

If PCS not available

BCA 11.3 Toggling sw DATA → HISTORY (six channels per BC)

11.4 Verify '**No History**' displayed for each channel.

BCA 12. sw MODE (up to four) → CHARGE

NOTE

1. BCs will start charging on first populated channel.
2. During EMU battery charge initiation (BC3 Ch4 and BC4 Ch4) voltage values in CHARGE column will read 0.0 for the first 2 to 6 minutes.

13. √Display CHARGE column indicates charging (voltage and amperage values displayed)

BSA 14. √CHARGE IN PROGRESS LED – On

NOTE

Opening the BSA door will stop all battery charging. Interruption of EMU battery charging will reduce the charged capacity.

TERMINATE (10 MINUTES)

When batteries have completed charge or per **MCC-H** instruction

BCA 16. √Display toggling – '**Charged**' and '**Look At**'

1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 3 of 4 pages

Record channels listed in '**Look At**' section on table below.

	BC1	BC2	BC3	BC4
Channels				

NOTE

Do not actuate BC switches when hourglass is displayed.

17. sw MODE (up to four) → STOP

BSA 18. ✓CHARGE IN PROGRESS LED – Off

BCA 19. ✓Display CHARGE column reads

CH: --
V: ----
A: ----

20. Verify channels listed as '**Look at**' were expected per **MCC-H**.

NOTE

Battery chargers may display the following messages for an empty slot:

'Batt circuit open'

'Short circuit error'

'Time-out error'

* If any unexpected '**Look at**' channels

* If PCS available

* PCS Airlock: EVA: Airlock Systems: Battery Charger
Assembly (BCA)

*

BCA

*

* ✓Status – Task Complete (for all channels with
batteries installed)

*

* Report unexpected channel status to **MCC-H**.

*

* If PCS not available

* BCA Toggling sw DATA → HISTORY (all six channels
per BC)

*

* ✓Display – '**Task Completed - OK**' for each
channel charged

*

* Report unexpected messages to **MCC-H**.

1.605 BSA BATTERY RECHARGE

(ISS EVA SYS/7A - ALL/FIN 4/HC/PAPER ON ISS) Page 4 of 4 pages

If EMU batteries charged (BC3 Ch4 and BC4 Ch4)

21. Report voltage(s) to **MCC-H**.

BCA 22. sw MAIN POWER (up to four) → OFF

√MAIN POWER LEDs (up to four) – Off

If REBAs were charged

EMU1,2 23. REBA/BSA Cables (two) ←|→ REBA Jumper Cables

24. Mate and stow REBA Jumper Cables.

BSA 25. REBA/BSA Cable ←|→ AUX CHARGE PORT

Stow REBA/BSA Cable in M-02 Bag.

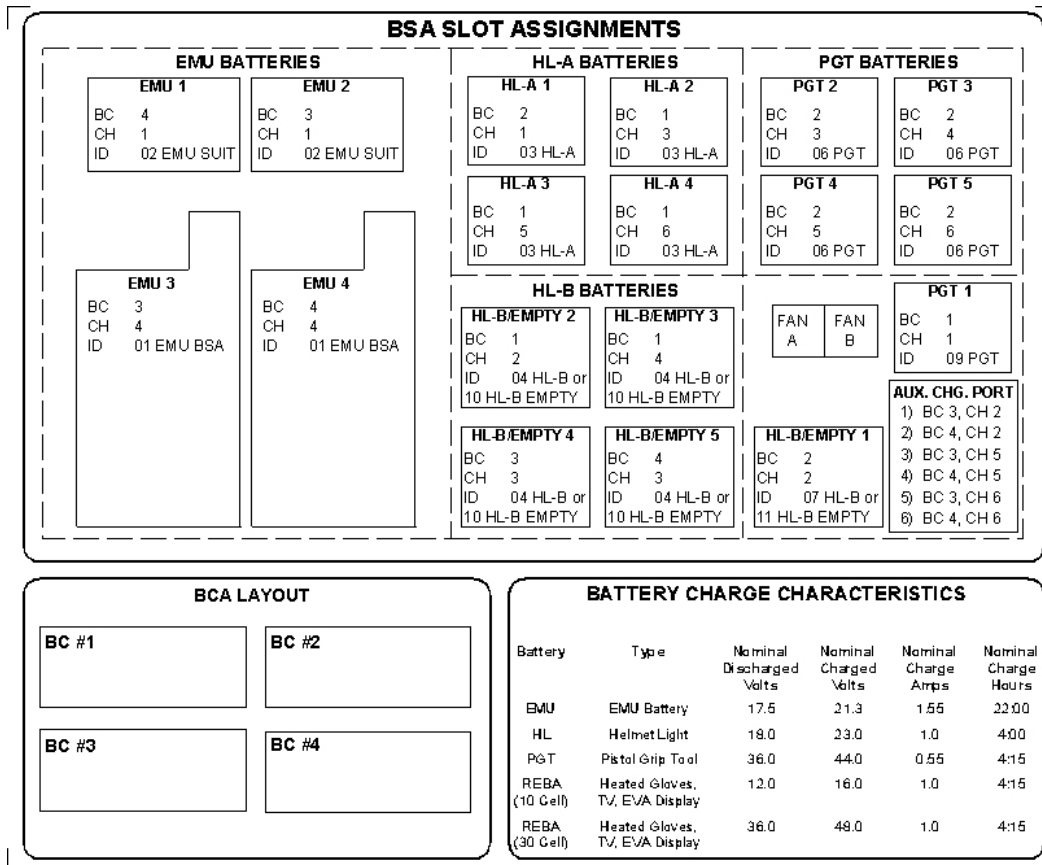


Figure 1.- BSA Door Display (for reference only).

1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE

(ISS EVA SYS/E8 - ALL/FIN 1/Paper on ISS)

Page 1 of 5 pages

I

(35 minutes for SSC Reconfiguration and Initiation)
(25 minutes for Termination and SSC Reconfiguration)

OBJECTIVE:

Perform a maintenance cycle on EMU Batteries installed in the BSA by using the "anzl" command in the REMOTE.EXE program, which fully charges the EMU Battery, then waits 1 hour before automatically performing a full discharge.

SSC RECONFIGURATION FOR AIRLOCK BCA OPERATION (15 MINUTES)

SSC

1. Shut Down SSC.
2. Remove PC Card (PCMCIA Network Card).
3. Relocate SSC Laptop to Equipment Lock near Battery Chargers.
4. Verify SSC Serial port has no debris or bent/recessed pins.
Verify SSC battery power is $\geq 50\%$.
5. Power on SSC and perform standard Windows Login.

If pop-up window(s) received regarding network connections

6. **On MCC-H GO**, click CANCEL on pop-up window(s).

7. On Start menu, select Shut Down.

On Shut Down pop-up window

8. Select Restart in MS DOS Mode.
9. Click OK.
10. After restart, verify C:\WINDOWS> prompt displayed.
11. At C:\WINDOWS> prompt, input "cd\issapps\td-639".
Press [ENTER].
12. Verify C:\ISSAPPS\TD-639> prompt displayed.

INITIATING MAINTENANCE (20 MINUTES)

NOTE

1. Battery Charger (BC) 3 and/or BC4 can be used for EMU battery maintenance.
2. If only one EMU Battery requires maintenance, either Charger may be used; however, for consistency, this procedure assumes BC4 use.
3. Once the maintenance has been initiated, the REMOTE.EXE program can be closed and the SSC Laptop can be disconnected from the BC.

13. Unstow BCM-PCS Interface Cable (SEG 33112927-301) from SPCE Maintenance Kit.

1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE

(ISS EVA SYS/E8 - ALL/FIN 1/Paper on ISS)

Page 2 of 5 pages

14. Verify SSC end of Interface Cable has no debris or recessed sockets.
Verify BCM end of Interface Cable has no debris or bent/recessed pins.

15. Unstow Common Tip Screwdriver 3" from Tool Box, Drawer 3.

- BSA
16. Install EMU Battery to be maintained in Battery Stowage Assembly (BSA) slot EMU 4.
Refer to BSA SLOT ASSIGNMENTS decal on inside of BSA door.

If an additional EMU Battery requires maintenance

17. Install EMU Battery to be discharged in BSA slot EMU 3.
Report EMU Battery barcodes and BSA slot locations to **MCC-H** as comm permits.

18. Remove Batteries from all other BC4 slots (two) in BSA: HL-B/Empty 5 and Aux Charge Port.
Refer to BSA SLOT ASSIGNMENTS decal on inside of BSA door.

If an additional EMU Battery requires maintenance

19. Remove Batteries from all other BC3 slots (two) in BSA: HL-B/Empty 4 and Aux Charge Port.

20. Close BSA door.
Verify BSA door is properly latched with no obstructions.

- UIA
21. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off

- PSA
22. √sw EMU MODE EMU 1,2 (two) – PWR
√sw SUIT SELECT (two) – OFF
√SUIT SELECT LEDs (four) – Off

NOTE

If two EMU Batteries require maintenance, from this point in the procedure, the steps should be performed only on BC4. The steps will be repeated for BC3 per step 52.

- BC4
23. sw MAIN POWER → ON

√MAIN POWER LEDs – On

Wait 20 seconds until pixel test is complete.

24. √Display readable and CHARGE column reads
CH: -
V: ----
A: ----

- BC4
25. sw MODE → STOP

1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE

(ISS EVA SYS/E8 - ALL/FIN 1/Paper on ISS)

Page 3 of 5 pages

- BC4 26. Verify channel profile according to Table 1 by toggling
sw DATA → HISTORY (four times)

Table 1. Initial BC4 (or BC3) Channel Profile

BC4 or BC3		
Ch Number	Battery Type	Charge History
CH 4	01EMU BSA	No History

- BC4 27. Remove REMOTE PORT cover with Screwdriver.
Verify port has no debris or recessed sockets.
28. BCM-PCS Interface Cable (end labeled BCM) →|← REMOTE PORT
Verify proper connection with thumbscrews installed.
- SSC 29. BCM-PCS Interface Cable (end labeled PCS) →|← Serial connector
(9-pin)
Verify proper connection with thumbscrews installed.
- BC4 30. sw MODE → STOP
31. sw DATA → REMOTE (two times)
32. √Display '**PCS MODE**'
- SSC 33. Verify C:\ISSAPPS\TD-639> prompt displayed.
34. At C:\ISSAPPS\TD-639>, input REMOTE.EXE.
Press [ENTER].
- SSC 35. Verify REMOTE CONTROL is highlighted.
If required, use arrow key to highlight REMOTE CONTROL.
Press [ENTER].
36. Use the arrow key to select UNIT 1: FUNCTION: CNFIG.
Press [ENTER].
37. Verify type: none
Verify port: COM1
Verify addr: 03F8
Verify int: 4
38. Use the arrow key to select type CASP 2000/H.
Press [ENTER].
39. Use arrow keys to select/highlight UNIT 1: FUNCTION: CNFIG.
Press [ENTER].

1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE

(ISS EVA SYS/E8 - ALL/FIN 1/Paper on ISS)

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40. Verify type: CASP 2000/H
Verify port: COM1
Verify addr: 03F8
Verify int: 4
41. Press [ENTER].
42. √UNIT 1: FUNCTION: STOP highlighted (not ↑STOP or ↓STOP)

Press [ENTER].
43. Verify UNIT 1: CASP REMOTE INTERFACE: '**BC0X-3 H 5.0 X7 OK**'.
44. Use the arrow key to select anlz. (not ↑anlz or ↓anlz)
Press [ENTER].

√UNIT 1 '**- Alt Charging - Ch 4** __:__:__ **C**' displayed on SSC with time counting up

If BC does not indicate alt charging on Channel 4 within 30 seconds
45. √UNIT 1: FUNCTION: ↑STOP highlighted

Press [ENTER].
Repeat until Channel 4 selected and alt charging.
46. Record current GMT ____/____:____:____

NOTE

Maintenance will be terminated if any nonvalid key on SSC is depressed. This may cause the BC/Laptop to lock up.

* If maintenance is accidentally terminated while
* the SSC is connected
* Perform steps 30 to 32, 42 to 46.
*
* Notify **MCC-H**.

- | | |
|-----|---|
| SSC | 47. Press [ESC].
Use arrow key to select/highlight RETURN TO DOS.
Press [ENTER]. |
| BC4 | 48. BCM-PCS Interface Cable (end labeled BCM) ← → REMOTE PORT

49. Reinstall REMOTE PORT cover with Screwdriver.

50. Verify Battery is still charging. |
| PCS | Airlock: EVA: Airlock Systems: Battery Charger Assembly (BCA) |

1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE

(ISS EVA SYS/E8 - ALL/FIN 1/Paper on ISS)

Page 5 of 5 pages

Verify BC4 volts > 14.3
Verify BC4 amps ~1.55

- SSC If an additional Charger is to be used for maintenance
51. At the DOS prompt, input "cls" (this will clean up the display).
Press [ENTER].
52. Repeat steps 23 through 50, this time using BC3.
- SSC 53. BCM-PCS Interface Cable (end labeled PCS) ←|→ Serial Connector
(9-pin)
- Stow Screwdriver in Tool Box, Drawer 3.
Stow BCM-PCS Interface Cable in SPCE Maintenance Kit.
54. ✓ **MCC-H** for expected completion time, as desired

TERMINATING MAINTENANCE (10 MINUTES)

When scheduled or per **MCC-H** direction

- Each BC 55. sw MODE → STOP
- Each BC If performing Battery maintenance for other EMU Batteries
56. Remove discharged EMU Battery(s) from BSA, stow.
- Each BC If complete with BCA operations
57. sw MAIN POWER (two) → OFF
- BSA 58. Remove discharged EMU Battery(s) from BSA, stow.

If performing EMU Battery recharge for the EMU Batteries currently installed

NOTE

After a 16-volt discharge, the Battery shall not be recharged until a 4-hour cool-down time has elapsed.

59. Contact **MCC-H**.

SSC RECONFIGURATION FOR NOMINAL OPERATIONS (15 MINUTES)

- SSC 60. Shut Down SSC.
61. Return the SSC Laptop to its previous location.
62. Install PC Card (PCMCIA Network Card).
Verify SSC battery power is ≥ 50 %.
63. Power up SSC (SSC will boot up in MS DOS Mode).
64. Verify C:\WINDOWS> prompt displayed.
65. At C:\WINDOWS> prompt, input exit.
Press [ENTER].
66. Verify SSC reboots to Windows.

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1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE

I

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS) Page 1 of 5 pages

(35 minutes for SSC Reconfiguration and Initiate)
(20 minutes for Terminate and SSC Reconfiguration)

OBJECTIVE:

Discharge EMU Batteries in the BSA using the SSC in DOS Mode.

SSC RECON FIG FOR AIRLOCK BCA OPERATION (15 MINUTES)

SSC

1. Shut down SSC.
2. Remove PC Card (PCMCIA Network Card).
3. Relocate SSC Laptop to Equipment Lock near Battery Chargers.
4. Verify SSC Serial Port has no debris or bent/recessed pins.
Verify SSC battery power is $\geq 50\%$.
5. Power on SSC and perform standard Windows Login.
If pop-up window(s) received regarding network connections
 6. **On MCC-H GO**, click CANCEL on pop-up window(s).
7. On Start menu, select Shut Down.
On Shut Down pop-up window
 8. Select Restart in MS-DOS Mode.
 9. Click OK.
10. After restart, verify C:\WINDOWS> prompt displayed.
11. At C:\WINDOWS> prompt, input "cd \issapps\td-639".
Press [ENTER].
12. Verify C:\ISSAPPS\TD-639> prompt displayed.

DISCHARGE INITIATION (20 MINUTES)

NOTE

1. Battery Charger (BC) 3 and/or BC4 can be used for EMU Battery discharge.
2. If only one EMU Battery is to be discharged, either Charger may be used; however, for consistency, this procedure assumes BC4 use.
3. Once the discharge has been initiated, the REMOTE.EXE program can be closed and the SSC Laptop can be disconnected from the BC.

13. Unstow BCM-PCS Interface Cable (SEG 33112927-301) from SPCE Maintenance Kit.
14. Verify SSC end of Interface Cable has no debris or recessed sockets.
Verify BCM end of Interface Cable has no debris or bent/recessed pins.

1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS) Page 2 of 5 pages

- LAB 15. Unstow Common Tip Screwdriver 3" from Tool Box, Drawer 3.
- BSA 16. Install EMU Battery to be discharged in Battery Stowage Assembly (BSA) slot EMU 4.
Refer to BSA SLOT ASSIGNMENTS decal on inside of BSA door.

If an additional EMU Battery is to be discharged

17. Install EMU Battery to be discharged in BSA slot EMU 3.
Report EMU Battery barcodes and BSA slot locations to **MCC-H** as comm permits.

18. Remove Batteries from all other BC4 slots (two) in BSA: HL-B/Empty 5 and Aux Charge Port.
Refer to BSA SLOT ASSIGNMENTS decal on inside of BSA door.

If an additional EMU Battery is to be discharged

19. Remove Batteries from all other BC3 slots (two) in BSA: HL-B/Empty 4 and Aux Charge Port.

20. Close BSA door.

- UIA 21. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off

- PSA 22. √sw EMU MODE EMU 1,2 (two) – PWR
√sw SUIT SELECT (two) – OFF
√SUIT SELECT LEDs (four) – Off

NOTE

If two EMU Batteries are being discharged from this point in the procedure, the steps should be performed only on BC4. The steps will be repeated for BC3 per step 52.

- BC4 23. sw MAIN POWER → ON

√MAIN POWER LEDs – On

Wait 20 seconds until pixel test is complete.

24. √Display readable and CHARGE column reads
CH: -
V: ----
A: ----

NOTE

MODE (middle) and DATA (right) switches are not labeled on BCA.

- BC4 25. sw MODE → STOP

1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS) Page 3 of 5 pages

- BC4 26. Verify channel profile according to Table 1 by toggling
sw DATA → HISTORY (four times)

Table 1. Initial BC4 (or BC3) Channel Profile

BC4 or BC3		
Ch Number	Battery Type	Charge History
CH 4	01EMU BSA	No History

- BC4 27. Remove REMOTE PORT cover with Screwdriver.
Verify port has no debris or recessed sockets.
28. BCM-PCS Interface Cable (end labeled BCM) →|← REMOTE PORT

Verify proper connection with thumbscrews installed.
- SSC 29. BCM-PCS Interface Cable (end labeled PCS) →|← Serial connector
(9-pin)

Verify proper connection with thumbscrews installed.
- BC4 30. sw MODE → STOP
31. sw DATA → REMOTE (two times)
32. √Display '**PCS MODE**'
- SSC 33. Verify C:\ISSAPPS\TD-639> prompt displayed.
34. At C:\ISSAPPS\TD-639>, input "remote.exe".
Press [ENTER].
35. Verify REMOTE CONTROL is highlighted.
Use arrow key to highlight REMOTE CONTROL, if required.
Press [ENTER].
36. Use the arrow key to select UNIT 1: FUNCTION: CNFIG.
Press [ENTER].
37. Verify type: none
Verify port: COM1
Verify addr: 03F8
Verify int: 4
38. Use the arrow key to select type CASP 2000/H.
Press [ENTER].
39. Use arrow keys to select/highlight UNIT 1: FUNCTION: CNFIG.
Press [ENTER].

1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS) Page 4 of 5 pages

40. Verify type: CASP 2000/H
Verify port: COM1
Verify addr: 03F8
Verify int: 4

41. Press [ENTER].

- SSC 42. √UNIT 1: FUNCTION: STOP highlighted (not ↑STOP or ↓STOP)

Press [ENTER].

43. Verify UNIT 1: CASP REMOTE INTERFACE: **BC0X-3 H 5.0 X7 OK.**

44. Use the arrow key to select disch.
Press [ENTER].

√UNIT 1 – '**Discharging Ch 4 __:__:__ D**' displayed on SSC with time counting up

If BC does not indicate discharging on Channel 4 within 30 seconds

45. √UNIT 1: FUNCTION: ↑STOP highlighted

Press [ENTER].

Repeat until Channel 4 selected and discharging.

46. Record current GMT ____/____:____:____

NOTE

Discharging will be terminated if any nonvalid key on SSC is depressed. This may cause the BC/Laptop to lock up.

- * If discharging is accidentally terminated while the
- * | SSC is connected
- * | Perform steps 30 to 32, 42 to 46.
- * |
- * | Notify **MCC-H**.

- SSC 47. Press [ESC].
Use arrow key to select/highlight RETURN TO DOS.
Press [ENTER].

- BC4 48. BCM-PCS Interface Cable (end labeled BCM) ←|→ REMOTE PORT

49. Reinstall REMOTE PORT cover with Screwdriver.

50. Verify Battery is still discharging.

- PCS Airlock: EVA: Airlock Systems: Battery Charger Assembly (BCA)

BCA

Verify BC4 volts > 14.3.

1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE

(ISS EVA SYS/7A - ALL/FIN 4/HC/Paper on ISS) Page 5 of 5 pages

If an additional EMU Battery is to be discharged

51. At the DOS prompt, input "cls" (this will clean up the display). Press [ENTER].
52. Repeat steps 23 through 50, using BC3.

- SSC 53. BCM-PCS Interface Cable (end labeled PCS) ←|→ Serial connector (9-pin)

Stow Screwdriver in Tool Box, Drawer 3.
Stow BCM-PCS Interface Cable in SPCE Maintenance Kit.

54. Continue discharging EMU Battery for required time per Table 2 as directed by **MCC-H**.

Table 2. Required Discharge Type Times

Discharge Type	Time (hr:min)
Battery Conditioning (3.0 A-hr)	2:00
16-volt Discharge	√ MCC-H

DISCHARGE TERMINATION (5 MINUTES)

When required discharge time has elapsed

- BC4,3 55. sw MODE (two)→ STOP

If not performing EMU Battery recharge

- BC4,3 56. sw MAIN POWER (two)→ OFF

- BSA 57. Remove discharged EMU Battery(s) from BSA, stow.

If performing EMU Battery recharge

58. Contact **MCC-H**.

NOTE

After a 16-volt discharge, the Battery shall not be recharged until a 4-hour, cool-down time has elapsed.

SSC RECONFIGURATION FOR NOMINAL OPERATIONS (15 MINUTES)

- SSC 59. Shut down SSC.
60. Return the SSC Laptop to its previous location.
61. Install PC Card (PCMCIA Network Card).
Verify SSC battery power is ≥ 50 %.
62. Power up SSC (SSC will boot up in MS-DOS mode).
63. Verify C:\WINDOWS> prompt displayed.
64. At C:\WINDOWS> prompt, input exit.
Press [ENTER].
65. Verify SSC reboots to Windows.

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1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

Page 1 of 7 pages

I

(30 Minutes for Prep and Initiate)

(65 Minutes for Monitoring, Terminate, and Cleanup)

OBJECTIVE:

Discharge one or more EMU batteries by placing them in the EMUs and running the fan/pump/separator system for a specified amount of time.

NOTE

1. Steps 1, 18, 41, and 57 should nominally be completed by **MCC-H**.
2. Step 1 should be completed prior to the start of DISCHARGE INITIATE (step 19).

EMU PREP FOR DISCHARGE (20 MINUTES)

1. CONFIGURING FOR EMU TELEMETRY

MCC-H/IV
PCS

- 1.1 Powering Up UHF 1(2) for EVA Operations on 414.2 MHz
Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16
(SODF: C&T: NOMINAL: UHF), then:

or

Perform {2.703 UHF 2 ORU ACTIVATION}, steps 1 to 16
(SODF: C&T: NOMINAL: UHF), then:

- 1.2 Verify Global Time System (GTS) transmitter disabled.

PLSS

2. Unzip rear PLSS TMG flap.
Leave flap open for duration of discharge.
3. Install EMU battery into EMU.
4. Verify PLSS Vent Port Plugs installed (no Metox).

HUT

5. Helmet ←|→ HUT

Temporarily stow helmet.

LTA ←|→ HUT

Temporarily stow LTA.

6. Unstow EMU Equipment Bag from MO-2 Bag (as required).
Unstow, install SOP Checkout Fixture (SCOF), lock.

If LCVG filled with water

7. Unstow LCVG.

LCVG →|← Multiple Water Connector, lock

If LCVG not filled with water

8. Unstow Cooling Loop Jumper from EMU Equipment Bag.
Remove cover from Multiple Water Connector (inside HUT).
Cooling Loop Jumper →|← Multiple Water Connector, lock

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

Page 2 of 7 pages

- DCM 9. Temp control vlv → Max C
- UIA 10. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
- C-Lk wall 11. Remove EV-2(1) SCU from stowage straps and pouch.
Transfer SCU to E-Lk.
- DCM 12. Remove DCM Cover.
Affix cover with Velcro to DCM.
13. SCU →|← DCM

√SCU locked
14. √sw POWER – SCU
√sw FAN – OFF
√O2 ACT – OFF
√sw WATER – OFF (water switch guard installed)
√sw COMM mode – OFF
15. Unstow designated EMU Water Recharge Bag from floor bin.
Attach bag to wall below IRU.
- IRU 16. EMU Water Recharge Bag →|← H2O IN port
17. √H2O Outlet vlv (rotary) – CLOSED
- MCC-H/IV** 18. INITIATING LTL FLOW TO AIRLOCK
With the following values, perform {1.203 LAB IATCS RFCA [X]
ACTIVATION}, all (SODF: TCS: ACTIVATION AND
CHECKOUT: IATCS), then:

where [X] = LAB NODE 1 LTL
[Y] = LTL
[Z] = RPCM LA1B F RPC 05

In step 2
Mode = Flow
Loop = LTL

In step 3
New Setpoint: 45.4 kg/hr

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

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DISCHARGE INITIATE (10 MINUTES)

NOTE

1. The IRU will be used to pressurize the EMU cooling loop. This avoids loss of EMU O2 during the extended duration of this discharge procedure.
2. **PWR RESTART** message occurs and BITE light is illuminated whenever EMU power is cycled.

PSA 19. sw MAIN POWER → ON

√MAIN POWER LED – On

20. √sw SUIT SELECT (two) – OFF

√SUIT SELECT LEDs (four) – Off

PSA 21. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU volts: 27.0 to 29.0

NOTE

1. Step 22 powers on the IRU.
2. Be prepared to verify the POWER, PRESS, and TEMP LEDs briefly illuminate when IRU POWER is taken ON.

IRU 22. sw POWER → ON

√POWER, PRESS, TEMP LEDs (three) – On (at startup)

23. Wait until 2.5-second LED and pixel check complete.

√POWER LED remains – On

24. H2O Outlet vlv (rotary) ↶ EMU SUPPLY.

UIA 25. √WATER EV-1,2 REG vlv (two) – SUPPLY

√WATER EV-1,2 SUPPLY vlv – CLOSED

26. WATER EV-2(1) SUPPLY vlv → OPEN

DCM 27. sw POWER → BATT

28. sw COMM mode → PRI

√sw Comm FREQ – LOW

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

Page 4 of 7 pages

29. sw FAN → ON

Expect **NO VENT FLOW** message, sw DISP → PRO

IRU 30. sw PUMP → ON

√PUMP LED – On

```
*****
*           If TEMP LED or PRESSURE LED – On
* IRU       sw PUMP → OFF
* DCM       sw FAN → OFF
*
*           Contact MCC-H.
*****
```

31. √STATUS: **BATT VDC** > 16.5

√STATUS: **BATT AMPS**: 2.4 to 4.0

√Fan noise steady

32. √**MCC-H** is receiving EMU data

CAUTION

To avoid improper shutdown of EMU electronics, do not allow BATT VDC to drop below 16.0 volts.

NOTE

1. Battery discharge can take several hours. **MCC-H** will monitor the BATT VDC down to 16.5V. Crew will monitor it below this point. BATT VDC will drop from 16.5 to 16.0 volts in approximately 30 minutes.
2. If a long LOS is expected near the end of the battery discharge, the crew may be required to monitor the voltage for longer than 30 minutes.
3. **MCC-H** will monitor the EMU H2O TEMP via telemetry to confirm water pump does not begin cavitating with the O2 Actuator in OFF.

```
*****
* If EMU H2O TEMP ≥ 80 and increasing
* O2 ACT → IV
*
* Slowly cycle Temp control vlv Max H and Max C while
* second crewmember depresses and holds pump
* priming valve on back of EMU (30 seconds minimum).
* Return to Max C.
*
* O2 ACT → OFF
*****
```

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

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MONITORING BATTERY VOLTAGE (30 MINUTES)

When EMU BATT VDC <16.5

MCC-H

33 Inform crew to begin monitoring BATT VDC on DCM.

IV DCM

34. Monitor STATUS: BATT VDC

When BATT VDC = 16.2 VDC

35. Perform DISCHARGE TERMINATION.

DISCHARGE TERMINATION (5 MINUTES)

NOTE

If two batteries (in-suits) are discharging simultaneously, a single battery (in-suit) discharge can be terminated by performing steps 36 to 39.

IV UIA 36. WATER EV-2(1) SUPPLY vlv → CLOSE

DCM 37. sw FAN → OFF

38. sw COMM mode → OFF

39. sw POWER → SCU

IRU 40. sw PUMP → OFF

√PUMP LED – Off

If additional EMU battery to be discharged

PLSS 41. Remove previously discharged battery.
Stow battery in MO-2 Bag.
Install battery to be discharged.

42. Go to step 25.

POST DISCHARGE CLEANUP (30 MINUTES)

43. Contact **MCC-H**, for ground to perform {2.211 LAB IATCS RFCA [X] DEACTIVATION}, all (SODF: TCS: NOMINAL: IATCS), then:

where [X] = LAB NODE 1 LTL

where [Y] = LTL

IRU 44. H2O Outlet vlv (rotary) ↻ CLOSED.

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

Page 6 of 7 pages

45. Record value from Quantity display.
Report bag serial number and quantity to **MCC-H** as comm permits.

Table 1

Date	H2O Quantity	Bag Serial Number

- IRU 46. sw POWER → OFF

√POWER LED – Off

47. EMU Water Recharge Bag ←|→ H2O IN port

Stow bag in floor bin.

Report new stowage location to **MCC-H** as comm permits.

- PSA 48. sw IRU/UTILITY POWER → OFF

√IRU/UTILITY POWER LED – Off

- PSA 49. sw MAIN POWER → OFF

√MAIN POWER LED – Off

50. EMU WATER DUMP

- PCS 50.1 Verifying Condensate Tank Configuration

Lab: ECLSS: H2O Vent

Lab Water Vent

√Water Vent System Status – Inhibited

If Water Vent System Status – Enabled

√**MCC-H**

√Condensate Tank Qty 1(2) <42.5 kg

If Condensate Tank Qty 1(2) >42.5 kg

√**MCC-H**

- DCM 50.2 O2 ACT → IV

- UIA 50.3 √WATER EV-2(1) SUPPLY vlv – CLOSE

1.620 IN-SUIT EMU BATTERY DISCHARGE USING FAN

(ISS EVA SYS/9A - ALL/FIN)

Page 7 of 7 pages

50.4 WATER EV-2(1) REG vlv → WASTE

Wait 30 seconds.

50.5 WATER EV-2(1) REG vlv → SUPPLY

50.6 Verify with **MCC-H** that 0.5 to 1.0 lbm of water dumped per EMU.

DCM 50.7 O2 ACT → OFF

50.8 Repeat steps 50.2 through 50.7 for other EMU (as required).

51. SCU ←|→ DCM

52. Install DCM cover.

C-Lk wall 53. Insert SCU in stowage pouch.

PLSS 54. Remove EMU battery from EMU.
Stow EMU battery in MO-2 Bag.

PLSS 55. Zip rear PLSS TMG flap.

HUT 56. LCVG (Cooling Loop Jumper) ←|→ Multiple Water Connector
Restow Cooling Loop Jumper in EMU Equipment Bag, as required.
Reinstall cover on Multiple Water Connector (inside HUT).

57. SOP Checkout Fixture (SCOF) ←|→ HUT

Restow SCOF in EMU Equipment Bag.
Restow EMU Equipment Bag in MO-2 Bag (as required).

58. Helmet →|← HUT
LTA →|← HUT

MCC-H/IV

59. POWERING DOWN UHF 1(2) AFTER EVA OPERATIONS

Go to {2.702 UHF 1 ORU DEACTIVATION}, all (SODF: C&T:
NOMINAL: UHF).

or

Go to {2.704 UHF 2 ORU DEACTIVATION}, all (SODF: C&T:
NOMINAL: UHF).

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1.625 EMU BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 2) Page 1 of 3 pages

(25 Minutes for Initiate)
(10 Minutes for Terminate)

OBJECTIVE:

Recharge up to two EMU Batteries using ISS EMU Battery Charger connected to the PSA Utility Power Outlet.

NOTE

1. PSA 28V IRU/Utility Power channel is limited to 7.0 amps between the UTILITY POWER OUTLET and the In-Flight Refill Unit (IRU). Two EMU Batteries can be charged simultaneously.
2. Both Batteries must be strapped to the ISS EMU Battery Charger for adequate heat dissipation.

INITIATE (25 MINUTES)

1. Unstow:
PSA 28V Utility Adapter
ISS EMU Battery Charger (labeled ISS 28V Power Only)
EMU Battery(s)

- PSA
2. √sw IRU/UTILITY POWER – OFF
√IRU/UTILITY POWER LED – Off

CAUTION

When mating/demating the PSA 28V Utility Adapter, do not twist body of Adapter.

3. PSA 28V Utility Adapter →|← UTILITY POWER OUTLET

- Battery
Charger
4. Charging Cable(s) →|← EMU Battery(s)
Strap Battery(s) to Charger.
Affix Charger/Battery(s) with Velcro to wall for charge.

- PSA
5. Battery Charger Power Supply Cable →|← PSA 28V Utility Adapter

6. sw MAIN POWER → ON

√MAIN POWER LED – On

7. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU volts: 27.0 to 29.0

√IRU stat – ON

- Battery
Charger
8. √ON LEDs (red) – On
√READY LEDs (green) – On (for 10 seconds at startup)
√READY LEDs (green) – Blinking

1.625 EMU BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 2) Page 2 of 3 pages

NOTE

EMU Batteries may experience a false charge completion due to passivation within the Battery. The passivation is removed with repeated attempts (two to three times) at charging the Battery.

9. After 15 minutes charging, verify charge continuing properly.

√ON LEDs (red) – On

√READY LEDs (green) – Blinking

* If ON LEDs (red) – Off and READY LEDs (green) – On
* after 15 minutes

* sw IRU/UTILITY POWER → OFF

*

* Wait 3 seconds.

*

* sw IRU/UTILITY POWER → ON

*

* √ON LEDs (red) – On

* √READY LEDs (green) – Blinking

*

* Report anomaly to **MCC-H**, continue charging.

NOTE

1. The absence of any active LEDs represents an overcurrent or overvoltage condition that has caused the Charger to shut down, or that the Charger has not been properly powered from the PSA. All protective conditions are resettable by taking the sw IRU/UTILITY POWER to OFF.
2. During the charge, the red ON LED will be illuminated and the green READY LED will continue to blink, giving positive indication that the Charger is still charging.
3. A channel with no Battery connected will give a nominal charge complete indication (red ON LED extinguished and green READY LED illuminated without blinking) due to the voltage output of the PSA.

1.625 EMU BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 2) Page 3 of 3 pages

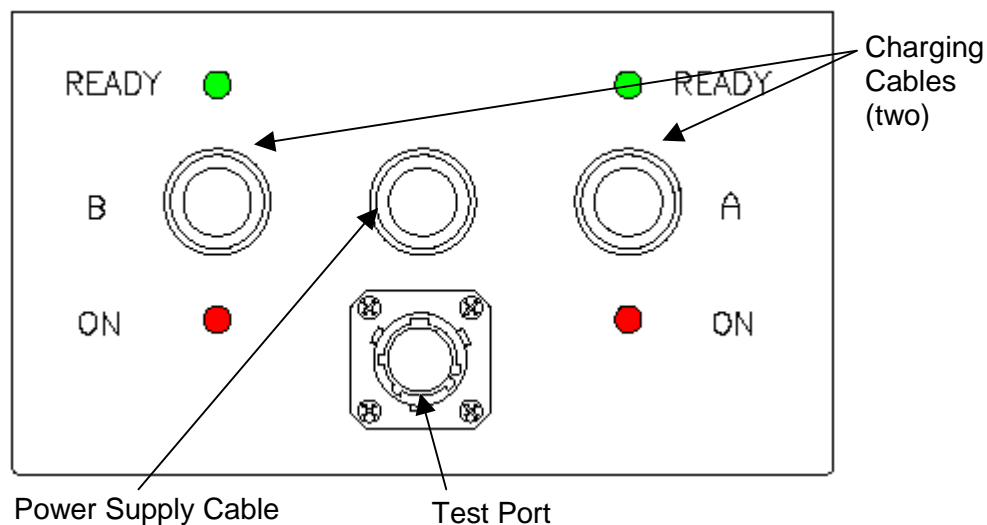


Figure 1.- Front Face of ISS EMU Battery Charger.

TERMINATE (10 MINUTES)

NOTE

When a nominal charge is complete, the red ON LED will extinguish and the green READY LED will illuminate without blinking. The red ON LED will be illuminated only when the positive current flow into the Battery is greater than 0.6A.

Battery 9. ✓ON LEDs (red) – Off
Charger ✓READY LEDs (green) – On

PSA 10. sw IRU/UTILITY POWER → OFF

✓IRU/UTILITY POWER LED – Off

If PSA power not required for other operations

11. sw MAIN POWER → OFF

✓MAIN POWER LED – Off

12. PSA 28V Utility Adapter ←|→ UTILITY POWER OUTLET

13. Battery Charger Power Supply Cable ←|→ PSA 28V Utility Adapter

Battery 14. Charging Cable(s) ←|→ EMU Battery(s)
Charger

15. Stow PSA 28V Utility Adapter.
Stow ISS EMU Battery Charger.

16. Report EMU Battery charge status and barcode to **MCC-H**.

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1.630 HELMET LIGHT/PGT BATTERY RECHARGE FROM PSA UTILITY OUTLET I

(ISS EVA SYS/8A - ALL/FIN 4) Page 1 of 4 pages

(25 Minutes for Initiate)
(10 Minutes for Terminate)

OBJECTIVE:

Recharge Helmet Light and/or PGT Batteries using EHIP Light Battery Charger powered from the PSA Utility Power Outlet.

NOTE

PSA 28V IRU/UTILITY POWER channel is limited to 7.0 amps between the UTILITY POWER OUTLET and the IN-FLIGHT REFILL UNIT (IRU). Do not charge more than six Helmet Light Batteries at once.

INITIATE (25 MINUTES)

A/L100

1. Unstow the following from B/U EVA Chargers CTB:
PSA 28V Utility Adapter
EHIP Light Battery Charger(s)
EHIP DC PWR/REBA DC EXT Y-Cable
EHIP-PGT Adapter Cable(s) (if required)

PSA

2. √sw IRU/UTILITY POWER – OFF
√IRU/UTILITY POWER LED – Off

CAUTION

When mating/demating the PSA 28V Utility Adapter, do not twist at the body of Adapter.

3. PSA 28V Utility Adapter →|← UTILITY POWER OUTLET

EHIP Light Batt.
Charger

4. EHIP DC PWR/REBA DC EXT Y-Cable →|← EHIP Light Battery Charger(s)
5. EHIP DC PWR/REBA DC EXT Y-Cable →|← PSA 28V Utility Adapter

PSA

6. sw MAIN POWER → ON
√MAIN POWER LED – On
7. sw IRU/UTILITY POWER → ON
√IRU/UTILITY POWER LED – On
√IRU volts: 27.0 to 29.0
√IRU stat – ON

EHIP Light Batt.
Charger

8. √NO BATTERY LEDs (blue, four per charger) – On

1.630 HELMET LIGHT/PGT BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 2 of 4 pages

```
*****
* If EHIP Light Battery Charger NO BATTERY
* LEDs (blue) – Off
* √Cable connections mated
*
* If LEDs still not illuminated
* sw IRU/UTILITY POWER → OFF
*
* EHIP DC PWR/REBA DC EXT Y-Cable ←|→
* EHIP Light Battery Charger
*
* Change EHIP Light Battery Charger fuse
* (7.5 amps).
*
* EHIP DC PWR/REBA DC EXT Y-Cable →|←
* EHIP LIGHT Charger
*
* sw IRU/UTILITY POWER → ON
*****
```

If charging Helmet Light Batteries

9. Helmet Light Batteries →|← EHIP Light Battery Charger

If charging PGT Batteries, perform for each Battery

PGT
Battery

10. EHIP-PGT Battery Adapter Cable →|← EHIP Light Battery Charger
11. Release captive screw on PGT Battery door using screwdriver.
12. Pry open PGT Battery door, rotate away from cavity.
13. Battery Jumper ←|→ PGT Battery
14. EHIP-PGT Adapter Cable plug →|← PGT Battery
15. Battery Jumper →|← EHIP-PGT Adapter Cable Protective Cap

16. √CHARGING LEDs (yellow) – On

Start timer (GMT____/____:____:____).

1.630 HELMET LIGHT/PGT BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 3 of 4 pages

* If CHARGING LED (yellow) – Off

* Refer to chart.

Indicator	Problem	Solution
MAINTENANCE LED (green) and TEMP FAULT LED (red) – On	Cold Battery ($\leq 50^{\circ}\text{F}$)	Leave Battery connected to Charger (will warm up and CHARGING LED will illuminate automatically)
TEMP FAULT LED (red) – On	Hot Battery ($\geq 113^{\circ}\text{F}$)	Leave Battery connected to Charger (will cool down and CHARGING LED will illuminate automatically)

When 15 minutes of charge complete

17. ✓ MAINTENANCE LEDs (green) – Off

* If MAINTENANCE LED (green) – On

* Remove Battery or EHIP-PGT Adapter Cable from affected station.

* When NO BATTERY LED (blue) – On

* Reinstall Battery or EHIP-PGT Adapter Cable.

* ✓ CHARGING LEDs (yellow) – On

* Continue charging.

TERMINATE (10 MINUTES)

EHIP Light Batt. 18. ✓ MAINTENANCE LEDs (green) – On
Charger

If Helmet Light Batteries charged

19. Helmet Light Batteries ←|→ EHIP Light Battery Charger

If PGT Batteries charged

20. EHIP-PGT Adapter Cable plug ←|→ PGT Battery

21. Battery Jumper →|← PGT Battery

22. Rotate Battery door into place.

Tighten Battery door screw using Screwdriver.

23. EHIP-PGT Adapter Cable ←|→ EHIP Light Battery Charger

PSA 24. sw IRU/UTILITY POWER → OFF

✓ IRU/UTILITY POWER LED – Off

1.630 HELMET LIGHT/PGT BATTERY RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 4 of 4 pages

If PSA power not required for other operations

25. sw MAIN POWER → OFF

√MAIN POWER LED – Off

26. PSA 28V Utility Adapter ←|→ UTILITY POWER OUTLET

27. EHIP DC PWR/REBA DC EXT Y-Cable ←|→ EHIP/PGT
Charger(s)

28. EHIP DC PWR/REBA DC EXT Y-Cable ←|→ PSA 28V Utility
Adapter

29. Restow the following in B/U EVA Chargers CTB
PSA 28V Utility Adapter
EHIP DC PWR / REBA DC EXT Y-Cable
EHIP Light Battery Charger(s)
EHIP-PGT Adapter Cable(s) (if required)

A/L1O0

30. Restow B/U Chargers CTB

31. Report Battery charge status to **MCC-H** as comm permits.

1.635 REBA RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 1 of 4 pages

I

(25 Minutes for Initiate)
(10 Minutes for Terminate)

OBJECTIVE:

Recharge REBA using REBA Charger powered from the PSA Utility Power Outlet.

NOTE

PSA 28V IRU/UTILITY POWER channel is limited to 7.0 amps between the UTILITY POWER OUTLET and the IN-FLIGHT REFILL UNIT (IRU). Only charge one REBA Battery at a time.

INITIATE (25 MINUTES)

- A/L100 1. Unstow the following from B/U EVA Chargers CTB:
- PSA 28V Utility Adapter
 - REBA Charger
 - EHIP DC PWR/ REBA DC EXT Y-Cable
 - REBA Charger Extension Cable (P/N SED33112216-301) (if required)
- PSA 2. √sw IRU/UTILITY POWER – OFF
√IRU/UTILITY POWER LED – Off

CAUTION

When mating/demating the PSA 28V Utility Adapter, do not twist at the body of Adapter.

3. PSA 28V Utility Adapter →|← UTILITY POWER OUTLET
4. EHIP DC PWR/REBA DC EXT Y-Cable →|← REBA Charger

If REBA Charger Extension Cable required

5. EHIP DC PWR/REBA DC EXT Y-Cable →|← REBA Charger Extension Cable
6. REBA Charger Extension Cable →|← PSA 28V Utility Adapter

If REBA Charger Extension Cable not required

7. EHIP DC PWR/REBA DC EXT Y-Cable →|← PSA 28V Utility Adapter

- PSA 8. sw MAIN POWER → ON
- √MAIN POWER LED – On
9. sw IRU/UTILITY POWER → ON
- √IRU/UTILITY POWER LED – On
- √IRU volts: 27.0 to 29.0
- √IRU stat – ON

(ISS EVA SYS/8A - ALL/FIN 4) Page 2 of 4 pages

```
*****
* If REBA Charger NO BATTERY LEDs – Off
*   √Cable connections mated
*
* If LEDs still not illuminated
*   sw IRU/UTILITY POWER → OFF
*
*   EHIP DC PWR/REBA DC EXT Y-Cable ←|→ REBA Charger
*
*   Change REBA Charger fuse (4.0 amps).
*
*   EHIP DC PWR/REBA DC EXT Y-Cable →|← REBA Charger
*
*   sw IRU/UTILITY POWER → ON
*****
```

12. Demate REBA Jumper Cable.
13. Charge Cable →|← REBA Jumper Cable
14. √CHARGING LED (yellow) – On

* If CHARGING LED (yellow) – Off		
* Refer to chart below.		

Indicator	Problem	Solution
READY LED (green) and TEMP FAULT LED (red) – On	Cold Batt (≤ 50° F)	Leave REBA connected to Charger (REBA will warm up and CHARGING LED will illuminate automatically)
TEMP FAULT LED (red) – On	Hot Batt (≥ 113° F)	Leave REBA connected to Charger (REBA will cool and CHARGING LED will illuminate automatically)

1.635 REBA RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 3 of 4 pages

When 15 minutes of charge complete

15. ✓READY LEDs (green) – Off

* If READY LED (green) – On

* Charge Cable ←|→ REBA Jumper Cable

*

* When NO BATTERY LED (blue) – On

* Charge Cable →|← REBA Jumper Cable

*

* ✓CHARGING LED (yellow) – On

*

* Continue charging.

TERMINATE (10 MINUTES)

REBA 16. ✓READY LED (green) – On
Charger

17. Charge Cable ←|→ REBA Jumper Cable

REBA 18. Mate REBA Jumper Cables.

If charging additional REBAs

19. Repeat INITIATE steps 10 to 15.

When last REBA recharge complete

PSA 20. sw IRU/UTILITY POWER → OFF

✓IRU/UTILITY POWER LED – Off

If PSA power not required for other operations

21. sw MAIN POWER → OFF

✓MAIN POWER LED – Off

22. PSA 28V Utility Adapter ←|→ UTILITY POWER OUTLET

23. EHIP DC PWR/REBA DC EXT Y-Cable ←|→ REBA Charger

If REBA Charger Extension Cable was used

24. EHIP DC PWR/REBA DC EXT Y-Cable ←|→ REBA Charger
Extension Cable

25. REBA Charger Extension Cable ←|→ PSA 28V Utility Adapter

If REBA Charger Extension Cable was not used

26. EHIP DC PWR/REBA DC EXT Y-Cable ←|→ PSA 28V Utility Adapter

1.635 REBA RECHARGE FROM PSA UTILITY OUTLET

(ISS EVA SYS/8A - ALL/FIN 4) Page 4 of 4 pages

27. Restow the following in B/U EVA Chargers CTB
 - PSA 28V Utility Adapter
 - EHIP DC PWR/REBA DC EXT Y-Cable
 - REBA Charger
 - REBA Charger Extension Cable (if required)

A/L100 28. Restow B/U EVA Chargers CTB

29. Report REBA charge status to **MCC-H** as comm permits.

1.640 GENERIC PSA UTILITY OUTLET OPS

(ISS EVA SYS/8A - ALL/FIN 2) Page 1 of 2 pages

I

OBJECTIVE:

Configure the PSA Utility Outlet for powering a generic piece of hardware.

NOTE

PSA 28V IRU/UTILITY POWER channel is limited to 7.0 amps between the UTILITY POWER OUTLET and the IN-FLIGHT REFILL UNIT (IRU).

INITIATE

- E-Lk 1. Unstow PSA 28V Utility Adapter.
Unstow item to be powered by outlet.
- PSA 2. √sw IRU/UTILITY POWER – OFF
√IRU/UTILITY POWER LED – Off
3. PSA 28V Utility Adapter →|← UTILITY POWER OUTLET
4. Item to be powered →|← PSA 28V Utility Adapter
- PCS 5. Verifying PSA RPC Config
Airlock: EPS: RPCM AL2A3B B
RPCM_AL2A3B_B
- √RPC 18 Airlock PSA Position – Closed
- PSA 6. sw MAIN POWER → ON
√MAIN POWER LED – On
7. sw IRU/UTILITY POWER → ON
√IRU/UTILITY POWER LED – On
√IRU volts: 27.0 to 29.0
√IRU stat – ON
- *****
* If IRU channel stat indicates FALT and PSA
* | FAULT LED is On
* | sw IRU/UTILITY POWER → OFF
* |
* | Contact **MCC-H**.

- √IRU amps: 0.1 to 0.7 (for barcode reader Battery Charger)

1.640 GENERIC PSA UTILITY OUTLET OPS

(ISS EVA SYS/8A - ALL/FIN 2) Page 2 of 2 pages

TERMINATE

When use of UTILITY POWER OUTLET complete:

PSA

1. sw IRU/UTILITY POWER → OFF

√IRU/UTILITY POWER LED – Off
2. sw MAIN POWER → OFF

√MAIN POWER LED – Off
3. Item powered by outlet ←|→ PSA 28V Utility Adapter
4. PSA 28V Utility Adapter ←|→ UTILITY POWER OUTLET
5. Stow PSA 28V Utility Adapter.
Stow item powered by outlet.

1.645 BCA SOFTWARE DOWNLOAD

(ISS EVA SYS/7A - ALL/FIN 4) Page 1 of 4 pages

I

OBJECTIVE:

Download new software parameters onto Battery Charger(s) using SSC.

NOTE

1. **MCC-H** will provide parameter table files and names for loading.
2. Parameter table files use the naming convention bc0S-V.cd5, where 0S represents the last two digits of the BCM serial number and the -V is the version number of the parameter table.
3. Parameter table files must be located in the same directory as the TABLES (C:\ISSAPPS\Td-639) application for download to be implemented.

1. Unstow BCM-PCS Interface Cable (SEG 33112927-301) from SPCE Maintenance Kit.
2. Unstow Common Tip Screwdriver 3" from ISS Common IVA Tool Kit, Drawer 3.

NOTE

SSC should have $\geq 50\%$ battery power prior to powering it up.

3. Set up SSC Laptop in Equipment Lock near Battery Chargers.
4. Disable screen saver.
5. Verify that new parameter table files have been copied to the SSC in the following directory:
C:\ISSAPPS\Td-639

BCA 6. $\sqrt{\text{sw}}$ MAIN POWER (four) – OFF

UIA 7. $\sqrt{\text{sw}}$ PWR EV-1,2 (two) – OFF
 $\sqrt{\text{PWR}}$ EV-1,2 LEDs (four) – Off

PSA 8. $\sqrt{\text{sw}}$ EMU MODE EMU 1,2 (two) – PWR

NOTE

BCx refers to the Battery Charger being connected for parameter table update. Battery Charger location noted on inside BSA door decal.

BCx 9. sw MAIN POWER → ON

$\sqrt{\text{MAIN POWER LED}}$ – On

Wait 20 seconds until pixel test is complete.

1.645 BCA SOFTWARE DOWNLOAD

(ISS EVA SYS/7A - ALL/FIN 4) Page 2 of 4 pages

10. ✓Display readable and CHARGE column reads CH: -
V: ----
A: ----
11. sw MODE → STOP
- BCx 12. Remove REMOTE PORT cover with Screwdriver.
- BCx 13. BCM-PCS Interface Cable (end labeled BCM) →|← REMOTE PORT
- SSC 14. BCM-PCS Interface Cable (end labeled PCS) →|← Serial connector (9-pin)
- BCx 15. sw DATA → REMOTE (one time)
16. Verify display message '**DOWNLOAD**'.
- BCx If display garbled/blank or Look At on display
17. sw MAIN POWER (two) → OFF
18. Repeat steps 9 to 11.
- SSC 19. Select Station Apps icon on SSC Windows desktop.
Select EMU Battery Discharge icon.
20. Select TABLES application icon.
21. Use the arrow key to select/highlight CONFIGURATION.
Press [ENTER].
22. Use the arrow key to select type: CASP 2000/H
Verify port: COM1
Verify addr: 03F8
Verify int: 4
- If required, use the tab and arrow keys to change port, addr, and int settings to those specified.
Press [ENTER].
23. Use the arrow key to select/highlight UP/DOWN LOADING.
Press [ENTER].
24. Use arrow keys to select/highlight LOAD.
Press [ENTER].
25. input parameter file – b c X X = X
Press [ENTER].
26. Use down arrow key to select/highlight SEND.
Press [ENTER].

1.645 BCA SOFTWARE DOWNLOAD

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27. In response to send gains?, use arrow key to select/highlight YES.
Press [ENTER].
28. Wait about 15 to 30 seconds for data to be sent (bytes and address increment separately), and for display to return to menu screen.
29. Use arrow keys to select/highlight EXIT.
Press [ENTER].
- SSC 30. Use down arrow key to select/highlight RETURN TO DOS.
Press [ENTER].
- BCx 31. sw MODE → STOP
32. sw DATA → REMOTE (two times)
33. Verify display message '**PCS MODE**'.
- SSC 34. Select REMOTE application icon in EMU Battery Discharge window.
35. Use the arrow key to select REMOTE CONTROL.
Press [ENTER].
36. Use the arrow key to select CNFIG.
Press [ENTER].
37. Use the arrow key to select type CASP 2000/H.
Verify port: COM1
Verify addr: 03F8
Verify int: 4

If required, use the tab and arrow keys to change port, addr, and int settings to those specified.
Press [ENTER].
38. √UNIT 1: FUNCTION: STOP highlighted (not ↑STOP or ↓STOP)

Press [ENTER].
39. Verify UNIT 1: CASP REMOTE INTERFACE: '**BC0S-V H 5.0 X7 ok**'
(where S = BC serial number and V = version of software).
40. Press [ESC].
41. Use down arrow key to select/highlight RETURN TO DOS.
Press [ENTER].
- BCx 42. sw MAIN POWER → OFF

1.645 BCA SOFTWARE DOWNLOAD

(ISS EVA SYS/7A - ALL/FIN 4) Page 4 of 4 pages

√MAIN POWER LED – Off

43. BCM-PCS Interface Cable ←|→ REMOTE PORT
44. Reinstall REMOTE PORT cover with Screwdriver.
45. Repeat steps 9 to 44 for remaining BCx, as required.

If downloads complete

SSC

46. BCM-PCS Interface Cable ←|→ Serial connector (9-pin)
47. Stow BCM-PCS Interface Cable in SPCE Maintenance Kit.
Stow Screwdriver in IVA Tool Kit.
Stow SSC, as required.

1.650 BSA FAN SWAP

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

In the event Battery Stowage Assembly (BSA) Fan A or Door Microswitch A fails, swap to Fan B and Door Microswitch B.

- NOD1 1. Unstow Phillips Screwdriver #1 from Tool Box, Drawer 3.
- BCA 2. √sw MAIN POWER (four) – OFF
 √MAIN POWER LEDs (four) – Off
- BSA 3. Open BSA door.
4. Unfasten captive screws (four) from BSA Fan Screen Assembly using Phillips Screwdriver #1.
 Refer to Figure 1.

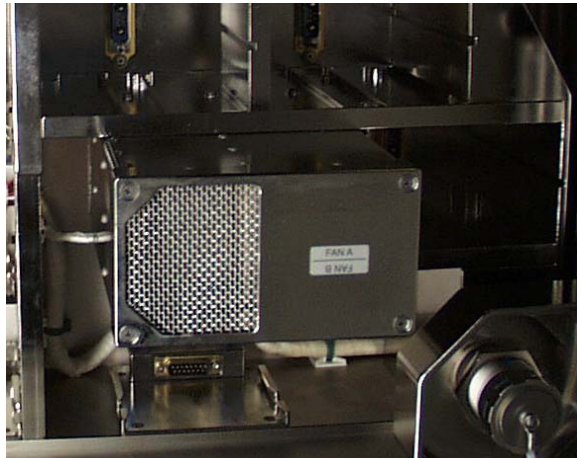


Figure 1.- BSA Fan Screen.

5. Remove BSA Fan Screen Assembly.
6. BSA Fan Screen Assembly ↻ 180° so that FAN B label is upright.
7. Reinstall BSA Fan Screen Assembly.
8. Fasten captive screws (four) on BSA Fan Screen Assembly using Phillips Screwdriver #1.
9. Swap locations for BSA Fan jumper plugs so that plug P5B is mated to the OPERATIONAL port and P5A is mated to the STOWAGE port.
Refer to Figure 2.

1.650 BSA FAN SWAP

(ISS EVA SYS/7A - ALL/FIN 3)

Page 2 of 2 pages

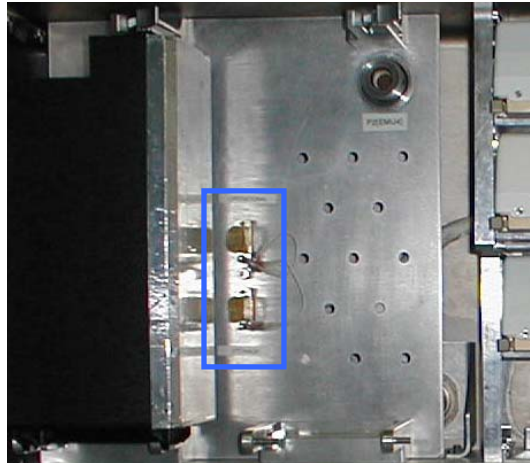


Figure 2.- BSA Fan Jumper Plugs.

BC1 10. sw MAIN POWER → ON

√MAIN POWER LED – On

11. Wait 7 seconds.

BSA √Fan operation (nominal noise and flow at BSA Fan Screen Assembly)

BC1 12. sw MAIN POWER → OFF

√MAIN POWER LED – Off

BSA 13. Close BSA door.

NOD1 14. Stow Phillips Screwdriver #1 in Tool Box, Drawer 3.

AIRLOCK MAINTENANCE

	<u>GND</u>	<u>ISS</u>
1.705 UIA BIOCIDe FILTER CHANGEOUT	257	MPV
1.710 SCU INSTALLATION ON UIA	259	MPV
1.715 SCU REMOVAL FROM UIA	263	MPV
1.720 PAYLOAD WATER RESERVOIR DE-GAS	267	MPV
1.725 PWR WATER CONSOLIDATION.....	271	MPV

AIRLOCK
MAINTENANCE

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1.705 UIA BIOCIDES FILTER CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 2 pages

I

(30 Minutes)

OBJECTIVE:

This procedure will serially changeout the UIA biocide filters.

- NOD1 1. Unstow from ISS IVA Toolbox:
 Drawer 2:
 Ratchet 3/8" Drive
 6" Extension
 5/16" Socket, 3/8" Drive
- E-Lk 2. Unstow new UIA biocide filters (two) from SPCE Maintenance Kit.
- PSA 3. √sw MAIN PWR– OFF
- UIA 4. Unfasten captive screws (four) on filter access door using Ratchet and 5/16" Socket with 6" Extension.



Figure 1.- UIA Filter Access Door.

5. Open filter access door.

NOTE

1. Have towel ready to clean up any residual water.
2. UIA biocide filter body is keyed to allow installation in only one direction.

6. UIA hose QDs (two) ←|→ UIA biocide filter
7. Loosen clamp latch nuts (two) by hand.
8. Swing clamp arms (two) away from filter.
Remove filter.

1.705 UIA BIOCIDES FILTER CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 2 of 2 pages

9. Install new UIA biocide filter in clamps such that FLOW decal is facing front.
10. Swing clamp arms (two) back over filter.
11. Hand-tighten clamp latch nuts (two).
12. UIA hose QDs (two) →|← UIA biocide filter
13. Repeat steps 6 to 12 for second UIA biocide filter.
14. Log new stowage location for filters in IMS.
15. Close filter access door.
16. Fasten captive screws (four) on filter access door using Ratchet and 5/16" Socket.
- E-Lk 17. Mark used UIA biocide filters and stow.
- NOD1 18. Stow in ISS IVA Toolbox:
Drawer 2:
Ratchet 3/8" Drive
6" Extension
5/16" Socket, 3/8" Drive

1.710 SCU INSTALLATION ON UIA

(ISS EVA SYS/7A - ALL/FIN 4/HC) Page 1 of 3 pages

I

(30 Minutes)

OBJECTIVE:

This procedure is written to simultaneously install two SCUs on the UIA.

C-Lk 1. Unstow the following:
IV Bag 7/16" Wobble Socket with 6" extension (in Socket Caddy)
 SCUs (two)
 EVA Ratchet
Tool Box 3/8" Torque Wrench, set to 115 in-lbs (Drawer 2)

PSA 2. √sw SUIT SELECT (two) – OFF
 √sw MAIN POWER – OFF

UIA 3. √sw PWR EV-1,2 (two) – OFF
 √PWR EV-1,2 LEDs (four) – Off
 √WATER SUPPLY EV-1,2 vlv (two) – CLOSE
 √OSCA – O2 CLOSED (O2 3AKP)

PCS 4. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE
 Airlock: ECLSS: O2 Hi P Supply Vlv
 AL O2 Hi Pressure Supply Valve

cmd Close (√Actual Position – Closed)

PCS 5. INHIBITING O2 HI P CAUTION
 C&W Summ
 Caution & Warning Summary
 'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 6 0 3 (O2 UIA Supply Pressure Low-A/L)

cmd Arm

cmd Execute

NOTE

Removal of ОПЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotated clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward.

1.710 SCU INSTALLATION ON UIA

(ISS EVA SYS/7A - ALL/FIN 4/HC) Page 2 of 3 pages



Figure 1.- OSCA and ОРЛАН Caps.

- UIA
6. ОРЛАН-I (II) cap 2 ←|→ OSCA
ОРЛАН-I (II) cap 3 ←|→ OSCA
 - OSCA ↻ PRESS (НАДДУВ)
 7. OXYGEN EMU1,2 vlv (two) → OPEN

NOTE

Step 8 will depressurize the UIA O2 supply lines via the OSCA prior to SCU installation.

8. OXYGEN ORLAN vlv → OPEN
9. When purge no longer audible
 - √EMU O2 SUPPLY PRESS gauge \cong 0
 - √ORLAN O2 SUPPLY PRESS gauge \cong 0
10. OSCA ↻ O2 CLOSED (O2 3AKP)
 - ОРЛАН-I (II) cap 2 → | ← OSCA
 - ОРЛАН-I (II) cap 3 → | ← OSCA
11. OXYGEN EMU 1,2 vlv (two) → CLOSE
12. OXYGEN ORLAN vlv → CLOSE
- SCU 13. Attach stowage pouches (with DCM connectors inside) to C-Lk wall using restraint straps.
- If first installation
- UIA 14. Remove UIA cover plates (two) using ratchet with 7/16" Socket.
Remove caps from UIA quick disconnects.
Stow UIA cover plates and caps in CTB Spare SCU/UIA Covers.

1.710 SCU INSTALLATION ON UIA

(ISS EVA SYS/7A - ALL/FIN 4/HC) Page 3 of 3 pages

- SCU 15. Remove SCU foam and protective covers.
Stow foam and protective covers in CTB Spare SCU/UIA Covers.

16. ✓ Mating bolt threads thinly coated with clear lubricant

* If insufficient lubricant
* | Apply thin coat of Braycote to first few threads
* | using disposable glove.

- UIA 17. ✓ UIA electrical connector guard O-Rings installed

18. SCU →|← UIA using alignment pins

Start bolt threads using socket only.

19. Mating bolts (two) ↻ using Torque Wrench with 7/16" Wobble Socket to 115 in-lbs (≅15 turns each).
Verify mate verification lines on SCU are no longer visible.

- SCU 20. Strain relief hooks (two) →|← tether points (two) on C-Lk wall

21. Route SCUs along C-Lk wall according to Figure 2 using 11 restraint straps per SCU.

22. Stow:
7/16" Wobble Socket with 6" extension (in Socket Caddy) and EVA Ratchet in C-Lk IV Bag
3/8" Torque Wrench in Tool Box, Drawer 2.

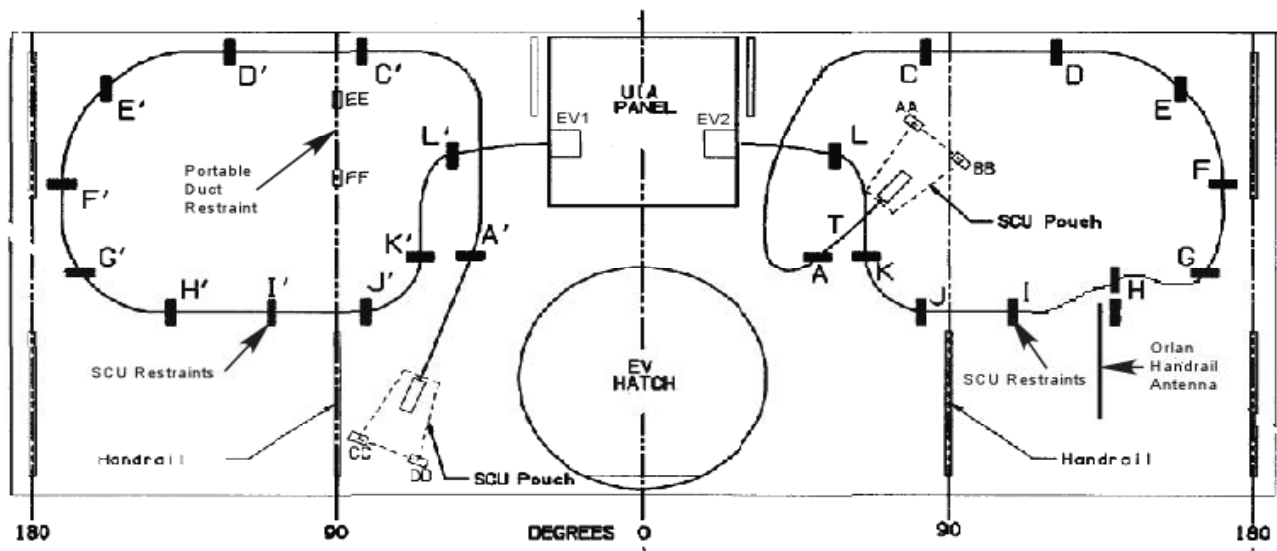


Figure 2.- SCU Routing in Crewlock.

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1.715 SCU REMOVAL FROM UIA

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 1 of 3 pages

I

(30 Minutes)

OBJECTIVE:

This procedure is written to simultaneously remove two SCUs from the UIA while the Crewlock is at station pressure. If removal at vacuum is required, refer to {SCU REMOVAL FROM UIA (AT VACUUM)} (SODF: ISS EVA SYSTEMS: CUFF CHECKLIST).

- | | |
|---------|---|
| C-Lk | 1. Unstow from C-Lk IV Bag:
7/16" socket with 6" extension (in socket caddy)
EVA ratchet |
| ORU Kit | 2. Unstow large Teflon squares and 1" Kapton Tape from ORU Tool Kit.

3. If replacement SCU will not be installed, unstow UIA UCB cover plates from CTB "Spare SCU/UIA Covers". |
| PSA | 4. √sw SUIT SELECT (two) – OFF
√sw MAIN POWER – OFF |
| UIA | 5. √sw PWR EV-1,2 (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√WATER SUPPLY EV-1,2 vlv (two) – CLOSE
√OSCA – O2 CLOSED (O2 3AKP) |
| DCM | 6. √SCU ← → DCM |
| PCS | 7. <u>CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE</u>
Airlock: ECLSS: O2 Hi P Supply Vlv
<div style="border: 1px solid black; padding: 2px;">AL O2 Hi Pressure Supply Valve</div> |

cmd Close (√Actual Position – Closed)

NOTE

Removal of OPJIAH caps is technique sensitive. For removal instructions, the cap is pushed inward and rotated clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward. Refer to Figure 1.

1.715 SCU REMOVAL FROM UIA

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 2 of 3 pages



Figure 1.- OSCA and ОРЛАН caps.

- UIA
8. ОРЛАН-I (II) cap 2 \leftarrow | \rightarrow OSCA
ОРЛАН-I (II) cap 3 \leftarrow | \rightarrow OSCA
 - OSCA \curvearrowright PRESS (НАДДУВ)
 9. OXYGEN EMU 1,2 vlv (two) \rightarrow OPEN

NOTE

Step 10 will depressurize the UIA O2 supply lines via the OSCA prior to SCU removal.

10. OXYGEN ORLAN vlv \rightarrow OPEN
11. When purge no longer audible
 - \sqrt EMU O2 SUPPLY PRESS gauge \cong 0
 - \sqrt ORLAN O2 SUPPLY PRESS gauge \cong 0
12. OSCA \curvearrowright O2 CLOSED (O2 3AKP)
 - ОРЛАН-I (II) cap 2 \rightarrow | \leftarrow OSCA
 - ОРЛАН-I (II) cap 3 \rightarrow | \leftarrow OSCA
13. OXYGEN EMU 1,2 vlv (two) \rightarrow CLOSE
- UIA
14. OXYGEN ORLAN vlv \rightarrow CLOSE
- C-Lk
15. Remove SCU from stowage straps on C-Lk wall.
- UIA
16. SCU \leftarrow | \rightarrow UIA by turning mating bolts (two) \curvearrowright using ratchet with 7/16" socket (\cong 15 turns each).
- SCU
17. Cover SCU (side that connects to UIA) with Teflon square. Secure Teflon square with Kapton Tape.

1.715 SCU REMOVAL FROM UIA

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 3 of 3 pages

- If replacement SCU will not be installed
- UIA | 18. UIA UCB Cover Plates → | ← UIA
 | Start threads using socket only to prevent cross-threading.
19. Strain relief hooks (two) ←|→ tether points (two) on C-Lk wall
20. Remove stowage pouches from C-Lk restraint straps (leave DCM connectors inside pouches).
 Stow SCUs.
- C-Lk 21. Stow in C-Lk IV Bag:
 7/16" socket with 6" extension (in socket caddy)
 EVA ratchet

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1.720 PAYLOAD WATER RESERVOIR DE-GAS

(ISS EVA SYS/E9 - ALL/FIN) Page 1 of 4 pages

I

(10 Minutes)

OBJECTIVE:

Manually remove gas from Payload Water Reservoir.

HARDWARE GATHERING AND PREPARATION

1. Gather the following hardware:

E-Lk Floor	EMU Water Recharge Bag (PWR)
Bin (A/L1D1)	PWR De-gas Tool (Modified 12 ga. wire splice) (Refer to Figure 3)
	11-in. Russian Bungees (two)
	Towel

- PWR
2. Install bungees by wrapping them around evenly spaced between the PWR velcro straps.
Refer to Figure 1.

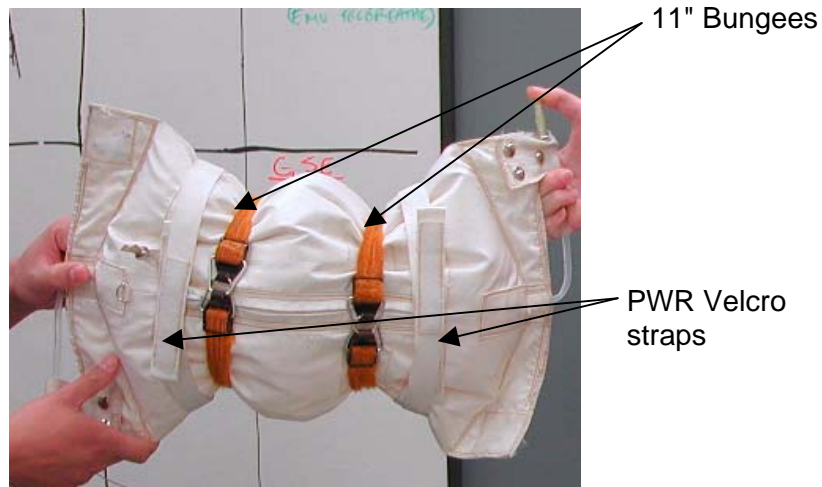


Figure 1.- PWR with Bungees Installed.

3. Cinch down the PWR Velcro restraint straps.
4. Depress the QD release button on the ground servicing port to remove the white cap from the ground servicing port.
Refer to Figure 2.

1.720 PAYLOAD WATER RESERVOIR DE-GAS

(ISS EVA SYS/E9 - ALL/FIN) Page 2 of 4 pages

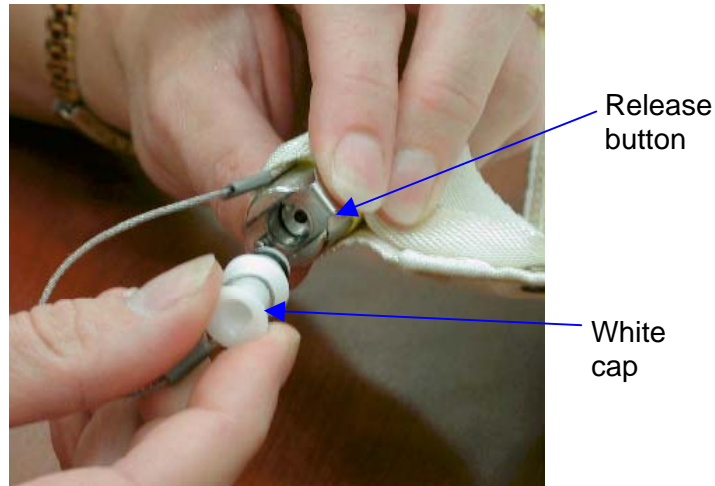


Figure 2.- PWR Ground Servicing Port.

5. ✓ QD release button is depressed to allow for insertion of the de-gas tool

DE-GASSING THE PWR

NOTE

Have towel ready to catch loose water when depressing the QD.

6. Insert the de-gas tool (notched side) into the ground servicing QD.

Press and release the tool once with thumb to test flow from the QD.
Refer to Figure 3.

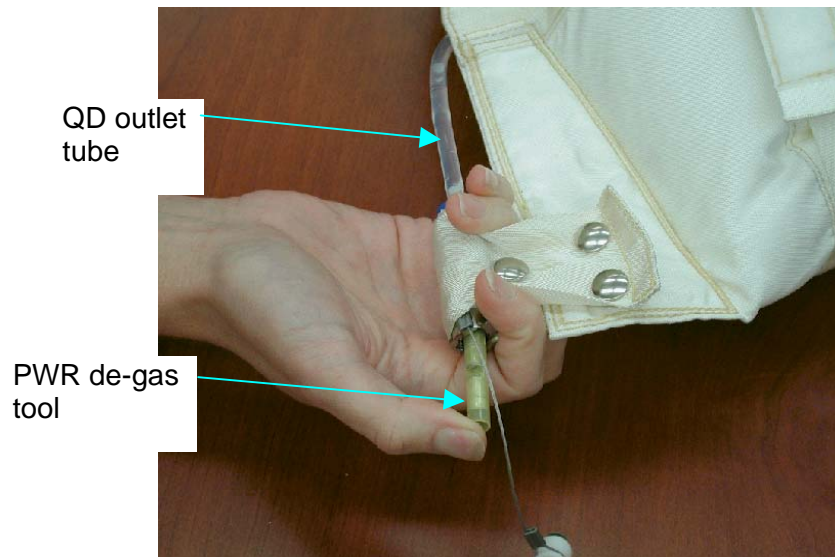


Figure 3.- Insertion of De-Gas Tool.

1.720 PAYLOAD WATER RESERVOIR DE-GAS

(ISS EVA SYS/E9 - ALL/FIN) Page 3 of 4 pages

NOTE

During rotation, the PWR should be held out perpendicular from your body axis to properly separate the gas. The bend of the PWR QD outlet tube should be kept closest to center of rotation. Refer to Figure 4.

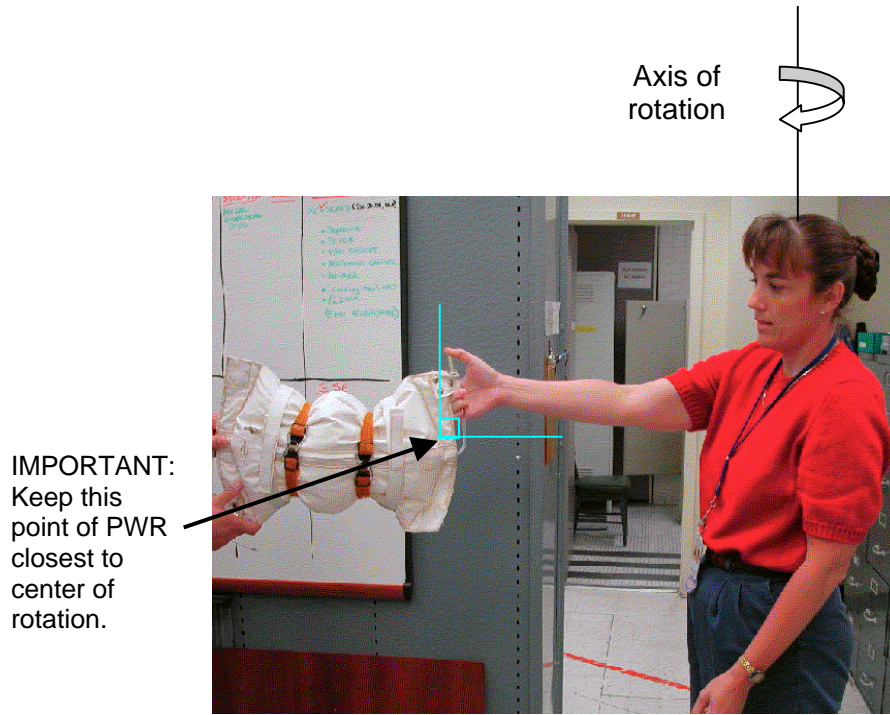


Figure 4.- Position for Rotation of PWR.

7. While holding the PWR, rotate yourself slowly (~15 rpm).

Once a steady rotation rate has been established

PWR

8. Depress the de-gas tool to allow gas to flow out of the bag.
9. Monitor QD outlet tube.

When outlet tube is nearly or completely free of gas

10. Release thumb from de-gas tool and stop spinning.
11. Remove bungees from PWR.
12. Zip open PWR restraint bag to inspect for gas bubbles.
13. Report any remaining gas bubbles to **MCC-H** as comm permits.
14. Repeat steps 7 to 13 as required.

1.720 PAYLOAD WATER RESERVOIR DE-GAS

(ISS EVA SYS/E9 - ALL/FIN) Page 4 of 4 pages

HARDWARE RESTOW

PWR 18. ✓ QD release button is depressed

Reinstall white QD cap on ground servicing port.

A/L1D1 19. Restow PWR de-gas tool in Ziplock Bag in E-Lk floor bin.

20. Return PWR, bungees, and towel to previous locations as required.

1.725 PWR WATER CONSOLIDATION

(ISS EVA SYS/E9 - ALL/FIN)

Page 1 of 3 pages

I

(10 minutes)

OBJECTIVE:

Transfer water from one Payload Water Reservoir (EMU Water Recharge Bag) to another in order to consolidate the water into a single bag.

E-Lk Floor

Bin

1. Unstow designated Payload Water Reservoirs.

PWRs

2. Unzip restraint bag to access bladder.

Report approximate visual quantity of H₂O and gas bubbles to **MCC-H** as comm permits.

3. Zip restraint bag closed.

4. Repeat steps 2 and 3 for other bag(s), as required.

A/L1F2

5. Restrain designated Supply PWR to wall below IRU.

IRU

6. √H₂O outlet vlv (rotary) – CLOSED

CAUTION

To avoid contaminating EMU supply lines, only designated EMU Water Recharge Bags with white labels should be connected to the H₂O IN port of the IRU.

7. Supply PWR →|← H₂O IN port

8. Collection PWR →|← AUX OUT port

PSA

If PSA not powered on

9. sw MAIN POWER → ON

√MAIN POWER LED – On

10. sw IRU/UTILITY POWER → ON

√IRU/UTILITY POWER LED – On

√IRU volts: 27.0 to 29.0

NOTE

1. The following step powers on the IRU.
2. Be prepared to verify the POWER, PRESS, and TEMP LEDs briefly illuminate when IRU POWER is taken ON.

1.725 PWR WATER CONSOLIDATION

(ISS EVA SYS/E9 - ALL/FIN)

Page 2 of 3 pages

IRU 11. sw POWER → ON

√POWER, PRESS, TEMP LEDs (three) – On (at startup)

When 2.5-second LED and pixel check complete.

12. √POWER LED remains – On

13. H2O outlet vlv (rotary) ↻ AUX OUT

CAUTION

Collection PWR should be monitored during fill to ensure that it does not pressurize or overflow.

14. sw PUMP → ON

√PUMP LED – On (green)

√QUANTITY display – ↑

* If TEMP LED or PRESSURE LED – On (yellow)

* sw PUMP → OFF

* Contact **MCC-H**.

When QUANTITY display – not increasing and Supply PWR is empty
(or when desired quantity has been transferred)

IRU

15. sw PUMP → OFF

16. H2O Outlet (rotary) vlv ↻ CLOSED

17. Supply PWR ←|→ H2O IN port

Disconnect Supply PWR from wall Velcro below IRU.

18. Record value from QUANTITY display on Table 1.

If another H2O transfer is needed

19. Attach New Supply PWR to wall below IRU.

IRU

New Supply PWR →|← H2O IN port

Return to step 13.

1.725 PWR WATER CONSOLIDATION

(ISS EVA SYS/E9 - ALL/FIN)

Page 3 of 3 pages

Table 1. PWR Transfer Quantity

Date	Supply PWR Serial number	Collection PWR Serial number	IRU QUANTITY

IRU

20. sw POWER → OFF

√POWER LED – Off

21. Collection PWR ←|→ AUX OUT Port

Collection PWR 22. Unzip restraint and inspect bag for approximate water and gas content.

Record on Table 2.

Table 2. Collection PWR Content

Date	Collection PWR Serial number	H2O (L)	Gas (mL)

Zip restraint bag closed.

A/L1D1

23. Restow bags in E-Lk floor bin.

24. Report results from Tables 1 and 2 and new stowage locations to **MCC-H** as comm permits.

PSA

25. sw IRU/UTILITY POWER → OFF

√IRU/UTILITY POWER LED – Off

If PSA not required for other applications

26. sw MAIN POWER → OFF

√MAIN POWER LED – Off

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EMU CONTINGENCY

	<u>GND</u>	<u>ISS</u>
2.105 DISPLAY LOSS DURING POWER TRANSFER (WARM RESTART).....	277	277
2.110 FAILED LEAK CHECK (5 PSIA).....	279	279
2.115 FAILED LEAK CHECK (14.7/10.2 PSIA).....	281	281
2.120 METOX/LIOH REPLACEMENT (MANNED).....	283	283
2.125 BATTERY REPLACEMENT (MANNED).....	285	285
2.130 SCU SWAP (MANNED).....	289	289
2.135 SCU SWAP (UNMANNED).....	291	MPV
2.140 EMU COLD RESTART (MANNED).....	293	293
2.170 SAFER BATTERY CHANGEOUT.....	295	MPV

EMU CONTINGENCY

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2.105 DISPLAY LOSS DURING POWER TRANSFER (WARM RESTART) I

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 1 of 1 page

(5 Minutes)

OBJECTIVE:

This procedure cycles EMU power while saving nonvolatile RAM in order to reset a locked up DCM display.

UIA If EMU on BATT power and SCU →|← DCM
 1. √sw PWR EV-1(2) – OFF
 √PWR EV-1(2) EMU LED – Off

DCM If EMU on SCU power
 2. sw POWER → BATT

UIA 3. sw PWR EV-1(2) → OFF
 √PWR EV-1(2) EMU LED – Off

WARNING

Fan will be off from steps 4 to 10 during which time CO2 buildup is a concern.

NOTE

Affected EMU will be without comm after step 6. Steps 6 and 7 should be read together before performing step 6.

DCM 4. sw FAN → OFF (expect **FAN SW OFF** message, sw DISP → PRO)

IV 5. Inform affected EV crewmember of impending comm loss.

DCM 6. sw POWER → SCU

Wait 7 seconds

DCM 7. sw POWER → BATT

When 5-second Power Restart complete

8. √Display – **O2 POS – XX**

9. sw FAN → ON (as required)

If display blank or locked up

10. Contact **MCC-H**.

If SCU power desired

UIA 11. √SCU →|← DCM

sw PWR EV-1(2) → ON

√PWR EV-1(2) EMU LED – On

√PWR EV-1(2) VOLTS: 18.0 to 19.0

DCM 12. sw POWER → SCU

13. √Display – **O2 POS – XX**

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2.110 FAILED LEAK CHECK (5 PSIA)

(ISS EVA SYS/7A - ALL/FIN 4/Paper on ISS) Page 1 of 1 page

OBJECTIVE:

Given a failed EMU leak check at the 5-psi hold during Crewlock Depress, this procedure attempts a manual leak check; and, if no-joy, represses the Crewlock for further troubleshooting.

Affected EV DCM 1. Repeat leak check on IV watch and suit pressure gauge as follows
1.1 O2 ACT → PRESS, until SUIT P = 4.2 to 4.4 and stable, compare with gauge

1.2 O2 ACT → IV

1.3 Start timing (1 minute, maximum $\Delta P = 0.3$ psi)

If leak check passed (suit pressure sensor unreliable)

2. Go to CREWLOCK DEPRESS portion of {CREWLOCK DEPRESS/REPRESS CUE CARD}, step 8 (SODF: ISS EVA SYS: EVA PREP/POST).

BOTH DCM 3. O2 ACT → IV

IV 4. IV Hatch equalization valve → NORM

When equalization complete

5. IV Hatch → open

6. IV Hatch equalization valve → OFF

Affected EV DCM 7. Repeat leak check as follows
7.1 √PURGE vlv – cl (dn)

7.2 O2 ACT → PRESS, until SUIT P = 4.2 to 4.4 and stable, compare with gauge

7.3 O2 ACT → IV

7.4 Start timing (1 minute, maximum $\Delta P = 0.3$ psi).

8. Contact **MCC-H**.

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2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 1 of 2 pages

I

(10 to 30 minutes)

OBJECTIVE:

Given a failed EMU leak check at cabin pressure, this procedure cycles through components to troubleshoot the leak.

NOTE

The following steps are performed on the leaking EMU only.

- | | | |
|----|-----|--|
| EV | DCM | 1. O2 ACT → PRESS |
| IV | | 2. Rotate lower arm assemblies 180 degrees clockwise and 360 degrees counterclockwise. |
| | | 3. Align suit arms. |
| | | 4. ✓Sizing rings locked |
| | | 5. Swivel hips from side to side. |
| EV | | 6. Repeat leak check as follows |
| | | 6.1 ✓Helmet purge vlv – cl, locked |
| | DCM | 6.2 ✓PURGE vlv – cl (dn) |
| | | 6.3 ✓STATUS: SUIT P : 4.2 to 4.4 and stable (compare with gauge) |
| | | 6.4 O2 ACT → IV, start timing, 1 minute (during EMU CHECKOUT, 2 minutes) (maximum $\Delta P = 0.3$ psi) |
| | | If leak check passed |
| | | 7. Go to step 30. |
| | | If leak check failed |
| | | 8. PURGE vlv → op (up) |
| | | 9. O2 ACT → OFF |
| | | 10. sw FAN → OFF (if EVA PREP) |
| | | 11. Cycle/inspect suit disconnects as follows |
| | | 11.1 Gloves |
| | | 11.2 Helmet (leave disconnected) |
| | | 11.3 LTA |
| | | 12. sw FAN → ON (if EVA PREP) |
| | | 13. Install Helmet. |

~

2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)

(ISS EVA SYS/7A - ALL/FIN 3/Paper on ISS) Page 2 of 2 pages

DCM	14. O2 ACT → PRESS
	15. Repeat leak check step 6, then:
	If leak check passed
	16. Go to step 30.
	If leak check failed
	17. PURGE vlv → op (up)
	18. O2 ACT → OFF
DCM	19. sw FAN → OFF (if EVA PREP)
	20. Cycle/inspect suit components
	21. Gloves
	22. Helmet (leave disconnected)
	23. Helmet purge valve
	24. Sizing rings
	25. Metox/LiOH cartridge (O-rings)
DCM	26. sw FAN → ON (if EVA PREP)
	27. Install Helmet.
DCM	28. O2 ACT → PRESS
	29. Repeat leak check step 6, then:
	If leak check passed
	30. ✓Waist ring covered
	31. ✓Wrist rings covered
	32. Return to normal operations. >>
	If leak check failed (EMU lost)
	33. Contact MCC-H .
	34. Go to {1.240 POST EVA}, all (SODF: ISS EVA SYS: EVA PREP/POST).

2.120 METOX/LIOH REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 1 of 2 pages

I

(15 Minutes)

OBJECTIVE:

Remove and replace Lithium Hydroxide (LiOH) or Metal Oxide (Metox) Canister from EMU during manned operations.

- IV 1. Unstow new Metox or LiOH Canister.
- PLSS 2. Unzip thermal cover.
Affix thermal cover with Velcro to top of EMU.

WARNING

1. Fan will be off during changeout. Perform changeout as quickly as possible.
2. Vent loop is pressurized. Restrain Metox or LiOH canister to avoid injury.

- DCM 3. $\sqrt{O_2}$ ACT – IV
4. Helmet purge vlv → op

- DCM 5. sw FAN → OFF

- IV PLSS 6. Remove expended Metox or LiOH Canister.

If installing LiOH

Holding new Canister with silver plate label facing self

7. Remove caps from new LiOH Canister (left first).

8. Install Canister in EMU (attach Velcro strap).
Latch Canister in place.

If installing Metox

9. Remove caps from new Metox Canister.

10. Install Metox using label on Canister for proper orientation.
Latch Canister in place.

NOTE

EMU may issue **CO2 HIGH** or **MONITOR CO2** message.

- DCM 11. sw FAN → ON
12. Helmet purge vlv → cl, locked
- DCM 13. O2 ACT → PRESS

2.120 METOX/LIOH REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 2 of 2 pages

14. PURGE vlv → op (up)
 15. Begin timing 2-minute purge.
 - IV PLSS 16. Close thermal cover zipper.
 17. Place caps on expended Metox or LiOH Canister.
Temporarily stow Canister.
 18. Report Metox and/or LiOH Canister barcodes and new stowage location to **MCC-H** as comm permits.
- When purge time = 2 minutes
- DCM 19. √STATUS: CO2 < 3.0 mmHg, then:
- PURGE vlv → cl (dn)
20. O2 ACT → IV
- NOTE**

A minimum of 40 minutes of prebreathe is required to condition Metox and LiOH Canisters.
21. Go to {1.225 EMU PREBREATHE}, all (SODF: ISS EVA SYS: EVA PREP/POST) with a minimum of 40-minute prebreathe.

2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/PAPER ON ISS) Page 1 of 3 pages

I

(15 Minutes)

OBJECTIVE:

Remove and replace a failed or degraded EMU battery during manned operations.

- IV 1. Unstow new EMU battery.
- PLSS 2. Unzip thermal cover.
Velcro thermal cover to top of EMU.

WARNING

1. POWER switch must be in SCU during battery changeout.
2. Fan will be off during changeout. Perform changeout as quickly as possible.

- EV DCM
- If no SCU power available
3. $\sqrt{O_2}$ ACT – IV
 4. Helmet purge vlv → op
 5. sw FAN → OFF

NOTE

EMU will be without comm after step 6 until battery power is restored at step 15.

- EV DCM
- If SCU power available
7. \sqrt{sw} POWER – SCU
 8. $\sqrt{O_2}$ ACT – IV
 9. Helmet purge vlv → op
- DCM
10. sw FAN → OFF

WARNING

Vent loop is pressurized. Restrain Metox or LiOH during battery changeout to avoid injury and to prevent breaking of vent loop seal.

- IV PLSS 11. Unlatch Metox or LiOH canister and rotate it outward.
12. Unlatch and remove used battery.

2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/PAPER ON ISS) Page 2 of 3 pages

13. Install new battery (✓connector alignment).
Engage latch.
14. ✓Metox or LiOH canister seated in vent ports.

Rotate downward until latch pins engage.
Latch canister in place.

- | | | | |
|------|-----|---------------------------|---|
| EV | DCM | If no SCU power available | 15. sw POWER → BATT |
| EV | | | 16. sw FAN → ON |
| | | | 17. Helmet purge vlv → cl, locked |
| | DCM | | 18. ✓STATUS: BATT VDC |
| IV | | | 19. Report the following to MCC-H as comm permits:
Old battery barcode and stowage location
New battery barcode and BATT VDC reading |
| PLSS | | | 20. Close thermal cover zipper. |

NOTE

The EMU calculated TIME EV and TIME LF do not reset despite the battery changeout. A cold restart is required to reset those parameters.

If required per **MCC-H**

21. COLD RESTART OF EMU CWS

WARNING

Fan and O2 will be OFF during restart.
Perform as quickly as possible.

- | | | |
|----|-----|-------------------|
| EV | DCM | 21.1 sw FAN → OFF |
| | | 21.2 O2 ACT → OFF |

NOTE

If SCU power not available, EMU will be without comm between steps 21.3 and 21.4.

- 21.3 sw POWER → BATT(SCU), wait 2 seconds.
- 21.4 sw POWER → SCU(BATT)
- 21.5 sw FAN → ON
- 21.6 O2 ACT → IV

2.125 BATTERY REPLACEMENT (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/PAPER ON ISS) Page 3 of 3 pages

- | | | |
|----|-----|--|
| EV | DCM | If Metox or LiOH canister seal was broken during changeout |
| | | 22. O2 ACT → PRESS |
| | | 23. PURGE vlv → op (up) |
| | | 24. Begin 2-minute purge. |
| | | When purge time = 2 minutes |
| | | 25. PURGE vlv → cl (dn) |
| | | 26. O2 ACT → IV |
| | | 27. Go to {1.225 EMU PREBREATHE} (SODF: ISS EVA SYS: EVA PREP/POST). |

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2.130 SCU SWAP (MANNED)

(ISS EVA SYS/7A - ALL/FIN 2/Paper on ISS) Page 1 of 1 page

I

(5 Minutes)

OBJECTIVE:

Swap Service and Cooling Umbilicals (SCUs) from one EMU to another due to an Airlock or EMU failure during suited operations.

- BOTH DCM 1. Temp control vlv → Max C
2. sw COMM mode → PRI
3. sw Comm FREQ → LOW
- If sw POWER – SCU
4. sw POWER → BATT (stagger switch throws)
- UIA 5. sw PWR EV-1,2 (two) → OFF
- √PWR EV-1,2 LEDs (four) – Off
- DCM 6. Swap SCUs.
- UIA 7. sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS: 18.0 to 19.0
- If SCU power desired
- DCM 8. sw POWER → SCU
9. sw COMM mode → HL (as required)
10. Temp control vlv → as required

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2.135 SCU SWAP (UNMANNED)

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 1 of 1 page

I

(5 Minutes)

OBJECTIVE:

Swap Service and Cooling Umbilicals due to an Airlock or EMU failure during unsuited operations.

- | | | | |
|------|-----|--------------------------|--------------|
| BOTH | DCM | 1. √sw FAN | – OFF |
| | | √O2 ACT | – OFF |
| | | √sw COMM mode | – OFF |
| | UIA | 2. sw PWR EV-1,2 (two) | → OFF |
| | | √PWR EV-1,2 LEDs (four) | – Off |
| | DCM | 3. Swap SCUs. | |
| | | If sw POWER – SCU | |
| | | 4. sw POWER | → BATT |
| | UIA | 5. sw PWR EV-1,2 (two) | → ON |
| | | √PWR EV-1,2 LEDs (four) | – On |
| | | √PWR EV-1,2 VOLTS (two): | 18.0 to 19.0 |
| | | If SCU power desired | |
| | DCM | 6. sw POWER | → SCU |

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2.140 EMU COLD RESTART (MANNED)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS)

Page 1 of 1 page

I

(5 Minutes)

OBJECTIVE:

Reset EMU caution and warning system by clearing nonvolatile RAM.

WARNING

This procedure should be used only at airlock pressures of 8.0 psia and higher. Fan and O2 will be off during restart. Perform restart as quickly as possible.

DCM 1. sw FAN → OFF

2. O2 ACT → OFF

If POWER – SCU

3. sw POWER → BATT

Wait 2 seconds.

4. sw POWER → SCU

If POWER – BATT

5. sw POWER → SCU

Wait 2 seconds.

6. sw POWER → BATT

7. O2 ACT → IV

8. sw FAN → ON

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2.170 SAFER BATTERY CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 1 page

I

(20 Minutes)

OBJECTIVE:

Remove and replace a degraded or failed SAFER battery.

1. Unstow new battery.
- Prop. Module 2. √Inhibitor installed
√MAN ISOL vlv – CL (up)
- HCM 3. √sw PWR – OFF
- Prop. Module 4. Remove T-Handle tool from lanyard while keeping Inhibitor installed on SAFER.
5. Separate TMG Velcro on bottom of Prop. Module to access battery.
6. Loosen captive screws (eight) using 9/64" Hex Wrench on T-Handle tool.
7. Remove battery.
8. Battery umbilical connector ←|→ SAFER
9. Stow used battery.
10. Record new battery serial number on SAFER CHECKOUT RESULTS Cue Card.
Report old battery serial number and new stowage location to **MCC-H** as comm permits.
11. Battery (new) umbilical connector →|← SAFER
Install new battery.
12. Tighten captive screws (eight).
13. Reattach TMG Velcro.
14. Attach T-Handle tool to lanyard.
15. Go to {1.430 SAFER CHECKOUT}, all (SODF: ISS EVA SYS: CHECKOUTS).

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AIRLOCK CONTINGENCY

	<u>GND</u>	<u>ISS</u>
2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA.....	299	299
2.216 CONTINGENCY CREWLOCK REPRESS.....	305	305
2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA.....	307	307
2.220 CONTINGENCY AIRLOCK DEPRESS USING VAJ.....	319	319
2.230 METOX REGENERATION CYCLE ABORT	321	321
2.235 METOX REGENERATOR TROUBLESHOOTING.....	323	MPV
2.250 UIA ACTIVATION AND CHECKOUT.....	337	337
2.255 METOX REGENERATION STANDBY.....	339	MPV

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2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 1 of 6 pages

(75 Minutes with Hatch inspection)
(55 Minutes without Hatch inspection)

OBJECTIVE:

This procedure provides the crew with the necessary steps to safe the Airlock in the event that the Crewlock fails its 5 psi leak check upon Repress. A small leak is defined as one that can be supported by consumables to allow for EV crew to ingress the Equipment Lock and perform safing activities at a habitable pressure.

NOTE

Steps 1 to 20 depress the Crewlock to vacuum and have the EV crew reopen the EV Hatch to check if there is debris that was caught in the hatch when it was closed. Steps 1 to 20 can be performed only if time and consumables permit.

1. √**MCC-H** that time and consumables permit Steps 1 to 20 to be performed

DEPRESS CREWLOCK AND INSPECT EV HATCH SEALS (20 MINUTES)

DCM

2. √SCU →|← DCM

3. √STATUS: **SUIT P** 4.2 to 4.4

Compare with gauge.

4. O2 ACT → EVA (expect **SET O2 PRESS** msg)
sw DISP → PRO

IV PCS

5. Airlock: ECLSS: PCA: VRIV
AL PCA VRIV
'Open'

cmd Arm (√Status – Armed)
cmd Open (√Position – Open)

IV A/L1A2

6. Emergency MPEV → Open

Monitor Suit P gauge < 5.5.

* If gauge ≥ 5.5, stop depress, √**MCC-H**.

7. ACTIVATING DEPRESS PUMP

MCC-H/IV
PCS

- 7.1 Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01
RPCM AL1A4A A RPC 01

√Close Cmd – Ena

cmd RPC Position – Close (√Position – Closed)

2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 2 of 6 pages

- EV UIA 7.2 \sqrt DEPRESS PUMP ENABLE LED – On
- sw DEPRESS PUMP PWR → ON
- Wait 10 seconds for startup.
- C-lk 7.3 DEPRESS PUMP MAN ISOV → OPEN
- When C-Lk at 2.0 psia (103 mmHg)
8. DEPRESS PUMP MAN ISOV → CLOSED
9. sw DEPRESS PUMP PWR → OFF
- EV DCM 10. When C-Lk dP/dT ~0, EV expect alert tone
- When EV Hatch $\Delta P < 0.5$ psi (26 mm Hg)
- EV C-Lk 11. EV Hatch → open
- Inspect EV Hatch Seals.
Remove any debris that is present.
- IV A/L1A2 12. Emergency MPEV → Closed
- PCS 13. Airlock: ECLSS: PCA: VRIV
- AL PCA VRIV
- ‘Close’
- cmd** Close (\sqrt Position – Closed)
- [REPRESSING CREWLOCK \(10 MINUTES\)](#)
- EV C-Lk 14. \sqrt Thermal cover – closed
- EV Hatch → close, lock
- DCM 15. O2 ACT → PRESS
- IV E-Lk 16. IV Hatch equalization valve → throttle OFF to NORM (as required,
EV expect alert tone)
- BOTH DCM 17. C-Lk at 4.0, EV expect alert tone
- When C-Lk at 5.0 (259 mm Hg)
- IV C-Lk 18. IV Hatch equalization valve → OFF (EV expect alert tone)
- Wait 30 seconds for pressure stabilization.
19. \sqrt C-Lk pressure integrity (2 minutes, $\Delta P \leq 0.1$ psi)

2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 3 of 6 pages

If leak check passed

20. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS CUE CARD}, steps 8 to 11 (SODF: ISS EVA SYS: EVA PREP/POST).

- C-Lk 21. IV Hatch equalization vlv → throttle OFF to NORM (EMER)
(as required, EV expect alert tone)

WARNING

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, leave O2 ACT – PRESS.

- BOTH DCM 22. O2 ACT → IV

23. When C-Lk dP/dT ~0 (EV expect alert tone)

CAUTION

Verify EV crew is clear of Hatch mechanism.

EV CREW SAFING (15 MINUTES)

- IV PCS 24. Airlock: ECLSS:
Airlock: ECLSS
'Equipment Lock'

Monitor dP/dT

- IV 25. When dP/dT < 0.10 mmHg/min
25. Open IV Hatch per decal.

26. IV Hatch equalization valve → OFF

- BOTH 27. EV crew ingress E-Lk.

- DCM 28. O2 ACT → OFF

29. PURGE vlv → op (up)

30. √sw COMM mode – HL

- IV 31. Install WATER sw guards (two).

32. √Glove heater switch (two) – OFF

2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 4 of 6 pages

If EMU TV capability

33. pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

PLSS 34. sw REBA → OFF (toward left arm of suit)

35. Lower arm cables ←|→ gloves

Stow lower arm and glove cable connectors under TMG.

If EMU TV capability

36. EMU TV power cable ←|→ EMU TV

EMU TV power cable →|← ground plug

DCM 37. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

Stow gloves in EMU Equipment Bag.

38. Helmet ←|→ EMU

Temporarily stow helmet.

39. Doff Comm Cap, disconnect from electrical harness.
Stow in EMU Equipment Bag.

NOTE

EV crew will be without SCU cooling while
IV performs SCU removal steps.

DCM 40. sw FAN → OFF

UIA 41. sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off

PSA 42. sw SUIT SELECT (two) → OFF

√SUITS SELECT LEDs (four) – Off

43. sw MAIN POWER → OFF

√MAIN POWER LED – Off

EACP 44. sw PWR → OFF

2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 5 of 6 pages

BOTH DCM 45. SCU ←|→ DCM

Install DCM Cover.

REMOVING SCU AND TOOLS FROM CREWLOCK (30 MINUTES)

IV C-Lk 46. Unstow from C-Lk IV Bag:
7/16" Socket with 6" extension (in socket caddy)
EVA Ratchet

UIA 47. √WATER SUPPLY EV-1, 2 vlv (two) – CLOSE
√OSCA – O2 CLOSED (O2 3AKP)

PCS 48. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE
Airlock: ECLSS: O2 Hi P Supply Vlv
AL O2 Hi Pressure Supply Valve

cmd Close (√Actual Position – Closed)

NOTE

Removal of ОРЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotate clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward. Refer to Figure 1.



Figure 1.- OSCA and ОРЛАН Caps.

UIA 49. ОРЛАН-I (II) cap 2 ←|→ OSCA
ОРЛАН-I (II) cap 3 ←|→ OSCA

OSCA ↻ PRESS (НАДДУВ)

2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 6 of 6 pages

50. √OXYGEN EMU 1,2 vlv (two) – OPEN

NOTE

The next step will depressurize the SCU and UIA supply lines via the OSCA prior to removal of the SCU.

51. OXYGEN ORLAN vlv → OPEN

When purge no longer audible

52. √EMU O2 SUPPLY PRESS gauge \cong 0
√ORLAN O2 SUPPLY PRESS gauge \cong 0

53. OSCA ↺ O2 CLOSED (O2 3AKP)

ОРЛАН-I (II) cap 2 → | ← OSCA
ОРЛАН-I (II) cap 3 → | ← OSCA

54. OXYGEN EMU 1,2 vlv (two) → CLOSE

55. OXYGEN ORLAN vlv → CLOSE

C-Lk 56. Remove SCU from stowage straps on C-Lk wall.

UIA 57. SCU ←|→ UIA (by turning SCU Mating bolts (two) ↺ using Ratchet with 7/16" Socket (~15 turns each))

58. Strain relief hooks (two) ←|→ tether points (two) on C-Lk wall

59. √DEPRESS PUMP MAN ISOV – CLOSED

60. Remove stowage pouches from C-Lk restraint straps (leave DCM connectors inside pouches).

61. Transfer to E-Lk from C-Lk
SCUs (with pouches)
Crewlock EVA Bags (four)
IV Bag
Staging Bag
All additional EVA tools

E-Lk 62. Close IV Hatch per decal.
√IV Hatch equalization valve – OFF

63. Install IV Hatch equalization valve cap.

ALL 64. Go to {1.240 POST EVA}, all (SODF: ISS EVA SYS: EVA PREP/POST).

√MCC-H for deltas

2.216 CONTINGENCY CREWLOCK REPRESS

(ISS EVA SYS/E6 - ALL/FIN 1/Paper on ISS)

Page 1 of 2 pages

(30 Minutes)

OBJECTIVE:

In the event of a failed closed IV hatch equalization valve, this procedure will disconnect the Vacuum Access Jumper (VAJ) connection at Emergency MPEV, so that the Emergency MPEV can be used for repress of the Crewlock.

TOOLS:

ISS IVA Toolbox:

Drawer 2:

5/32" Hex Head, 1/4" Drive

Ratchet, 1/4" Drive

ACCESS

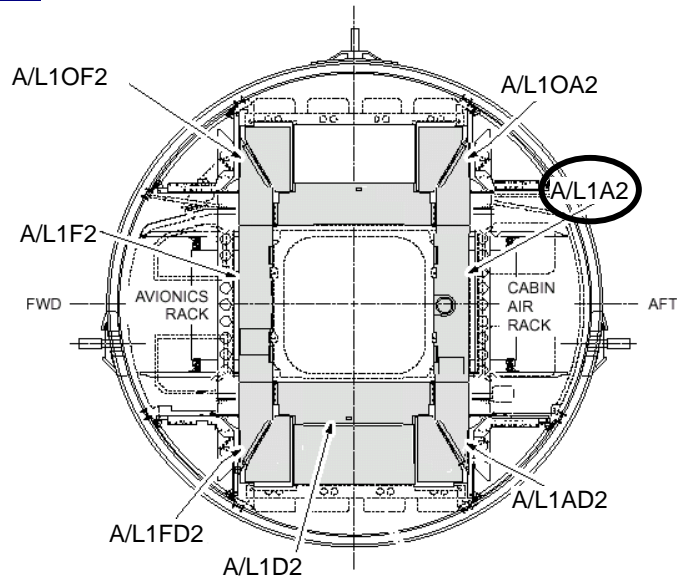


Figure 1.- Airlock Starboard Closeout Panels.

1. Remove Airlock Starboard Closeout Panel A/L1A2 (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive). Refer to Figure 1. Temporarily stow Closeout Panel.

VERIFYING VALVE CONFIGURATION

WARNING

Disconnecting the VAJ with the Airlock PCA VRIV opened will vent cabin air to space.

- PCS
2. Airlock: ECLSS: PCA: VRIV

Airlock PCA VRIV

√Position – Closed
 3. √EMERGENCY MPEV – Closed

2.216 CONTINGENCY CREWLOCK REPRESS

(ISS EVA SYS/E6 - ALL/FIN 1/Paper on ISS)

Page 2 of 2 pages

4. Straight end of VAJ ←|→ EMERGENCY MPEV Snout

APPLYING P&I CHANGES TO SODF

5. Make the following changes to SODF: ISS EVA SYS: CREWLOCK DEPRESS/REPRESS CUE CARD: CREWLOCK REPRESS.

Step 4

From: IV Hatch equalization valve → throttle OFF to NORM (as required, EV expect alert tone)

To: EMERGENCY MPEV → throttle CLOSED to OPEN (as required, EV expect alert tone)

Step 6

From: IV Hatch equalization valve → OFF (EV expect alert tone)

To: EMERGENCY MPEV → CLOSED (EV expect alert tone)

Step 10

From: IV Hatch equalization valve → NORM, (EV expect alert tone)

To: EMERGENCY MPEV → OPEN, (EV expect alert tone)

6. Make the following changes to SODF: ISS EVA SYS: POST EVA: 1.240 POST EVA.

Step 1

From: IV Hatch equalization valve → OFF

To: EMERGENCY MPEV → CLOSED

CLOSE OUT

7. Install Airlock Starboard Closeout Panel A/L1A2.

Tighten all fasteners snug (Ratchet, 1/4" Drive; 5/32" Hex Head, 1/4" Drive).

Refer to Figure 1.

POST MAINTENANCE

8. Stow tools, materials, equipment.

9. Inform **MCC-H** task complete.

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

(ISS EVA SYS/9A - ALL/FIN 2/SPN/PAPER ON ISS) Page 1 of 12 pages

I

OBJECTIVE:

Depress the Airlock to 10.2 psia in order to resolve an EMU configuration problem and avoid an unrecoverable break in prebreathe protocol.

NOTE

MCC-H will perform steps 1 to 6 from the ground.

1. CONFIGURING MCA FOR AIRLOCK SAMPLING

PCS

1.1 US Lab: ECLSS: AR Rack: MCA: Nominal Cmds

Lab MCA Nominal Commands

√State – Operate (Standby)

If State not Operate (Standby)
Go to step 2.

1.2 'Rapid Sampling'

cmd Airlock

√State – Standby, Operate

NOTE

Once the MCA is rapid sampling, it will take approximately 6 minutes to purge the lines. Airlock constituent data is not accurate until this purge is complete.

1.3 US Lab: ECLSS: AR Rack: MCA

LAB MCA

'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating 10 seconds

√Sample Location – Airlock

1.4 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Arm

cmd Execute

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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2. VERIFYING OXYGEN AND NITROGEN SYSTEM

PCS

2.1 Airlock: ECLSS: Oxygen System

'O2 Hi Pressure Supply Valve'

√Actual Position – Open

'High Pressure'

√UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia)

2.2 'O2 Low Pressure Supply Valve'

√Actual Position – Open

'Low Pressure'

√PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia)

2.3 Airlock: ECLSS: Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

√PCA N2 Line Press: 689 to 930 kPa (100 to 135 psia)

3. CONFIGURING C&W FOR ACS CAMPOUT MODE

PCS

3.1 C&W Summ

'Event Code Tools'

sel Inhibit

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Arm

cmd Execute

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Arm

cmd Execute

3.2 sel Enable

input Event Code – 5 9 1 2 (Cabin SD Fail-A/L)

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cmd Execute

input Event Code – 6 5 3 7 (Cabin SD Lens Contamination-A/L)

cmd Execute

input Event Code – 6 5 3 9 (Cabin SD Active BIT Fail-A/L)

cmd Execute

NOTE

Upon IMV Fan deactivation, rpm sensor registers 0 volts. MDM conversion translates 0 volts (0 counts) to 7164 ± 50 rpm.

4. TERMINATING AIRLOCK IMV

PCS

4.1 Node 1: ECLSS: IMV Stbd Aft Fan

Node 1 IMV Stbd Aft Fan

'Off'

cmd Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Off ($\sqrt{\text{State}}$ – Off)

$\sqrt{\text{Speed}}$, rpm: $\sim 7164 \pm 50$

4.2 Node 1: ECLSS: IMV Stbd Aft Valve

Node 1 IMV Stbd Aft Vlv

$\sqrt{\text{State}}$ – Enabled

'Close'

cmd Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Close

Wait 15 seconds.

$\sqrt{\text{Position}}$ – Closed

4.3 Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

$\sqrt{\text{State}}$ – Enabled

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If Position – Open
| 'Close'

| **cmd** Arm (√Status – Armed)
| **cmd** Close

| Wait 15 seconds.

| √Position – Closed

4.4 Airlock: ECLSS: Duct SD
AL Duct Smoke Detector
'Monitoring'

cmd Inhibit

√Status – Inhibited

5. INITIATING ACS CAMPOUT (10.2 psia) MODE

PCS

5.1 Airlock: ECLSS: PCA: Global ACS Commands
Global ACS Commands
'LAB ACS'

√Auto Pressure/Composition Control – Monitor

'Airlock ACS'

√Auto Pressure/Composition Control – Monitor

'Campout'

cmd Initiate

NOTE

The Airlock PCA NIV may open when Campout is initiated due to a change in the gas introduction limits. It will close when the Airlock Auto Pressure/Composition Control is inhibited.

5.2 'ACS Primary PCA'

√Primary PCA – LAB/Airlock

'Airlock ACS'

If Auto Pressure/Composition Control – Comp Control

cmd Inhibit (√ – Monitor)

'LAB ACS'

If Auto Pressure/Composition Control – Comp Control

cmd Inhibit (√ – Monitor)

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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5.3 Airlock: ECLSS: PCA

AL ACS

√ACS Campout Status – Campout

sel N2 Intro Valve

AL PCA N2 Intro Valve

√Position – Closed

6. INHIBITING AIRLOCK RAPID DEPRESS RESPONSE

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

cmd Inhibit – Arm (√Status – Armed)

cmd Inhibit

√Airlock Depress Response-INT MDM Status – Inhibited

7. VERIFYING AIRLOCK EQUIPMENT

7.1 Verify PBA Bottles and Masks located in Airlock for every isolated crewmember.

Verify PBA Bottles →|← Masks for each non-EVA crewmember in the Airlock.

Verify Oxygen Bottle pressure gauge needle \geq 3000 psig for each Bottle.

7.2 Verify two CSA-CPs located in Airlock.

Verify Battery power for both CSA-CPs.

8. ACTIVATING AIRLOCK CO2 REMOVAL (as required)

8.1 Unstow Metox Canisters (two) used previously.

8.2 Remove caps from Metox Canisters.

8.3 Stow caps in EMU Equipment Bag.

A/L1A1 8.4 Rotate EDDA open.

8.5 Report Metox Canister barcodes to **MCC-H**.

8.6 Open CO2 Removal Receptacle door.

8.7 √CO2 VALVE – REMOVAL

8.8 Install Metox Canisters in CO2 Removal Receptacle per label on closeout.

8.9 Close and latch CO2 Removal Receptacle door.

8.10 Rotate EDDA closed.

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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9. CLOSING NODE 1 STBD HATCH

NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

9.1 ✓ **MCC-H** for Go to continue

9.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped

9.3 Check Hatch seal and close Node 1 Stbd Hatch per decal
(omit last step of decal).

10. DEPRESSING TO 10.2 PSIA

UIA

10.1 ✓ DEPRESS PUMP ENABLE LED – On

10.2 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk

DEPRESS PUMP MAN ISOV → OPEN

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

10.3 ✓ Cab Press – decreasing

When Cab Press < 14.1 psia (729 mmHg) or **On MCC-H GO**

10.4 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

10.5 Crank Handle – Stowed Position

NOTE

1. CSA-CP % O2 will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

10.6 Continue depress to 12.5 psia (646 mmHg).
Refer to Figure 1.
Monitor using CSA-CP during depress.

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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	When Airlock is at 12.5 psia (646 mmHg)
C-Lk	10.7 DEPRESS PUMP MAN ISOV → CLOSED
	10.8 Verify O2 is greater than 24.5 %
	If O2 < 24.5 %
DCM	10.9 PURGE vlv → op (up) until O2 > 24.5 %, then:
	10.10 PURGE vlv → cl (dn)
C-Lk	10.11 DEPRESS PUMP MAN ISOV → OPEN
	10.12 Continue depress to 10.2 psia (527 mmHg). Refer to Figure 1.
C-Lk	10.13 DEPRESS PUMP MAN ISOV → CLOSED
	10.14 Verify O2 is between 23.5 % and 28.8 %.
UIA	10.15 sw DEPRESS PUMP PWR → OFF
	<div><div>NOTE</div><div>MCC-H will perform step 11 from the ground.</div></div>

11. ENABLING AIRLOCK RAPID DEPRESS RESPONSE AND ALARM

PCS	11.1 Airlock: ECLSS <div>Airlock: ECLSS</div> <div>'Equipment Lock'</div> Wait until $ dP/dT < 0.04$ mmHg/min.
	11.2 Rapid Depress: Rapid Depress Response Software Control <div>US Rapid Depress Response Software Control</div> <div>'Airlock Depress Response – INT MDM'</div> cmd Enable √Airlock Depress Response – INT MDM Status – Enabled
	11.3 C&W Summ <div>Caution & Warning Summary</div> <div>'Event Code Tools'</div> sel Enable <div>Enable an Event</div> input Event Code – <u>6</u> <u>5</u> <u>7</u> <u>6</u> (Rapid Depress-A/L) cmd Execute

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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12. DEPRESSURIZING AFFECTED EMU

DCM

12.1 O2 ACT → OFF

12.2 PURGE vlv → op (up)

12.3 sw REBA → OFF (toward left arm of suit)

If EMU TV already configured

12.4 pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

PLSS

12.5 EMU TV power cable ←|→ EMU TV
EMU TV power cable →|← ground plug

12.6 Lower arm cables ←|→ gloves
Stow lower arm and glove cable connectors under TMG.

DCM

12.7 √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

Stow gloves in EMU Equipment Bag.

12.8 Helmet ←|→ EMU

Temporarily stow helmet.

DCM

12.9 sw FAN → OFF

12.10 Doff other EMU components as needed.

13. MAINTAINING SUFFICIENT PPO2

If O2 concentration drops below 24 %, on unaffected EMU

DCM

13.1 PURGE vlv → op (up)

When O2 concentration approximately 24.5 %

DCM

13.2 PURGE vlv → cl (dn)

14. RECONFIGURING AFFECTED EMU

When EMU problem resolved, perform the following as required

14.1 √Suit arms aligned

14.2 √Gloves ←|→ EMU

√Wrist disconnects – op

14.3 Don thumb loops.

14.4 √Drink vlv position

14.5 √Biomed connector is outside of HUT.

14.6 Don HUT.

~

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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- 14.7 Release thumb loops.
- 14.8 ✓Suit arms aligned
- 14.9 Don EV glasses as required.
Don comm cap.
- 14.10 ✓Comm
- 14.11 Biomed pigtail →|← electrical harness
- 14.12 LCVG →|← Multiple Water Connector
✓Multiple Water Connector locked
- 14.13 ✓Thermal cover clear of waist ring
- 14.14 Waist ring → engage position
- 14.15 Waist ring →|← HUT
✓Waist ring locked
- 14.16 Remove donning handles.
Stow donning handles in EMU Equipment Bag.
- 14.17 Cover waist ring.
- 14.18 ✓Drink vlv position
- 14.19 ✓Mic boom position
- 14.20 Don comfort gloves, wristlets.
- 14.21 Wrist rings → engage position
- 14.22 Don EV gloves.
✓EV gloves locked
- 14.23 Tighten palm restraint straps.
- 14.24 ✓sw Glove heater (two) – OFF
- 14.25 ✓sw REBA – OFF (toward left arm of suit)
- 14.26 Lower arm power harness cables →|← Gloves
Stow slack under arm TMG.

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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- 14.27 ✓Cuff C/L position
✓Wrist mirrors installed
- CAUTION**
Minimize fan operation with O2 ACT – OFF (~2 minutes).
- DCM 14.28 sw FAN → ON
- 14.29 ✓Electrical harness clear of neck ring
- 14.30 Don helmet.
✓Helmet locked
- DCM 14.31 O2 ACT → IV
- 14.32 ✓Helmet purge vlv – cl, locked
- DCM 14.33 PURGE vlv → cl (dn)
- If EMU TV capability
- 14.34 Unstow EMU TV power cable.
- 14.35 EMU TV power cable ←|→ Ground plug
- 14.36 EMU TV power cable →|← EMU TV

EMU CHECK (5 MINUTES) FOR AFFECTED EMU

15. ✓Cooling

* If cooling insufficient

* | Slowly cycle Temp control vlv between 7 and Max C

* | while IV depress and hold pump priming valve on

* | back of EMU (30 seconds minimum).

DCM 16. Temp control vlv → as required

17. ✓Wrist rings – covered
✓Waist rings – covered
✓sw WATER – OFF
✓sw POWER – SCU
✓sw FAN – ON
✓sw Comm FREQ – LOW
✓Helmet purge vlv – cl, locked
- DCM ✓PURGE vlv – cl (dn)

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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NOTE

During leak check, when **SET O2 IV** message is displayed, wait 30 seconds and $\sqrt{\text{SUIT P}}$ gauge stable (4.2 to 4.4) before moving O2 ACT \rightarrow IV.

18. sw DISP \rightarrow STATUS, until **LEAK CHECK?** displayed
sw DISP \rightarrow YES (Follow displayed instructions).
19. Contact **MCC-H** to obtain total EMU Prebreathe time.
20. For affected EMU, go to {1.220 EMU PURGE} (SODF: ISS EVA SYS: EVA PREP/POST).

2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA

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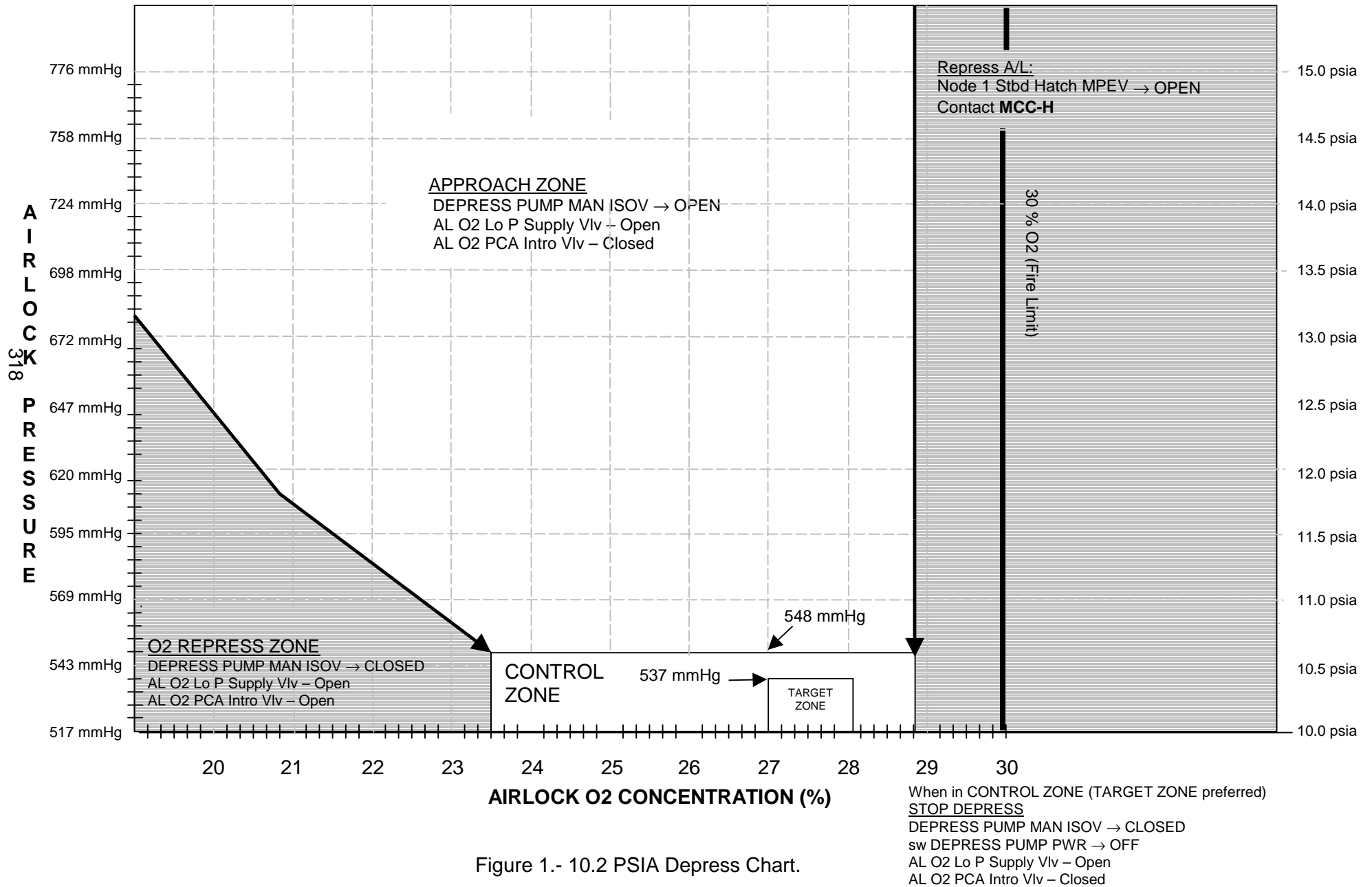


Figure 1.- 10.2 PSIA Depress Chart.

2.220 CONTINGENCY AIRLOCK DEPRESS USING VAJ

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OBJECTIVE:

Depress Joint Airlock in the event of a failed Depress Pump by using the VAJ connected to the Airlock VRIV.

NOTE

This procedure should be performed in conjunction with
1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION.

1. VERIFYING AIRLOCK CONFIGURATION PRIOR TO DEPRESS

PCS

1.1 Node 1: ECLSS: IMV Stbd Aft Fan

Node 1 IMV Stbd Aft Fan

√State – Off

√Speed, rpm: ~7164 ± 50

1.2 Node 1: ECLSS: IMV Stbd Aft Valve

Node 1 IMV Stbd Aft Vlv

√Position – Closed

1.3 Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

√Position – Closed

Node 1
Stbd
Hatch

1.4 √Node Stbd Hatch MPEV – CLOSED and uncapped

1.5 √Node 1 Stbd Hatch in the equalize position (orange stripe)

2. VERIFYING AIRLOCK RAPID DEPRESS RESPONSE STATUS

PCS

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response - INT MDM'

√Status – Inhibited

3. OPENING AIRLOCK VRIV

PCS

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open (√Position – Open)

2.220 CONTINGENCY AIRLOCK DEPRESS USING VAJ

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4. INITIATING AIRLOCK DEPRESS

√**MCC-H** for Target Pressure: _____ mmHg

WARNING

Opening the Emergency MPEV will vent the Airlock to space and may cause a loud hissing noise. Crew in the vicinity should don earplugs.

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

Monitor Cab Press.

A/L1A2

Emergency MPEV → Open

When Equipment Lock Cab Press = Target Pressure

Emergency MPEV → Closed

5. CLOSING AIRLOCK VRIV

PCS

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Close'

cmd Close (√Position – Closed)

2.230 METOX REGENERATION CYCLE ABORT

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(5 Minutes for Abort)
(5 Minutes for Powerdown)

OBJECTIVE:

This procedure immediately stops the Metox Regenerator heating cycle and starts the cool down period. The Metox Canisters will not be considered regenerated.

1. ABORTING METOX HEATING CYCLE (5 MINUTES)

Metox
Regen

1.1 sw CYCLE → SHUTDOWN

- 1.2 ✓CYCLE ABORT INITIATED LED – On
✓REGENERATE COOLING LED – On
✓TIME REMAINING display – decreasing from 4:00

NOTE

The nominal cooling phase is 4 hours. Only regenerator fan is running during this operation.

2. POWERING DOWN METOX REGENERATOR (5 MINUTES)

When display = 0:00

2.1 ✓OVEN HOT LED – Off

2.2 sw POWER → OFF

CAUTION

Metox Canisters should not be left in oven after the completion of a cycle abort. Opening the oven door changes diverter valve back to heating position exposing Canister interior to CCAA flow.

2.3 Open regenerator door.

2.4 Remove Metox Canister(s).

2.5 Close regenerator door.

2.6 Unstow Metox Canister caps from EMU Equipment Bag.
Install caps on Canisters.
Stow Canisters.

2.7 Report Metox Canister barcode and new stowage location to
MCC-H as comm permits.

2.8 Open CO2 Removal Receptacle door.

CO2 VALVE → REMOVAL

2.9 For the Airlock CCAA to set the desired Temperature Setpoint to 25° C, go to {2.501 CABIN TEMPERATURE CONTROL}, all (SODF: ECLSS: NOMINAL: THC).

CO2
Removal
Receptacle

MCC-H
/IV PCS

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2.235 METOX REGENERATOR TROUBLESHOOTING

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OBJECTIVE:

Given a fault or error on the Metox Regenerator this procedure provides troubleshooting steps for the crew to perform.

NOTE

1. For error codes that direct crew to contact **MCC-H**, report error code and time indicated on display.
2. If multiple errors present, error codes will be listed sequentially. Contact **MCC-H** prior to taking action.

DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
(none)	Power source interruption of < 5 seconds	Abort Condition (Cooling mode not initiated)	POWER INTERRUPT LED – Blinking	If initiating new regen sw CYCLE → START If terminating previous regen Contact MCC-H to determine additional regen time. sw CYCLE → START
E:02	Attempted to start regeneration in cooling mode	No Start Condition	VALVE/DOOR LED – Blinking	Cycle Oven Door > 90° sw CYCLE → START
E:03	Attempted to start regeneration with sw MODE – STANDBY	No Start Condition	STANDBY LOCAL LED – Blinking	sw MODE → REGENERATE sw CYCLE → START
E:04	Attempted to start regeneration with erroneous REMOTE STANDBY discrete active	No Start Condition	STANDBY REMOTE LED – Blinking	sw MODE → STANDBY sw MODE → REGENERATE sw CYCLE → START Contact MCC-H
E:05	Attempted to start regeneration with sw FAULT OVERRIDE – ON	No Start Condition	FAULT OVERRIDE ON LED – Blinking	sw FAULT OVERRIDE → OFF sw CYCLE → START

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:06	Regenerator left in STANDBY > 6 hours when activated during heating cycle	Abort Condition (4-hour cooling mode initiated)	CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	sw POWER → OFF When ready to resume, Perform {1.510 METOX REGENERATION } (SODF: ISS EVA SYS: EMU MAINTENANCE)
E:07	Erroneous boot discrete present without test discrete	Overridable Condition	CTRL LED – On	Contact MCC-H (Controller suspect)
E:08	RAM test failure	Dead Condition	CTRL LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:09	ROM test failure	Dead Condition	CTRL LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:10	Upper Cannister Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On	Contact MCC-H
E:11	Lower Cannister Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On	Contact MCC-H
E:12	Door Unlock Solenoid overcurrent	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact MCC-H
E:13	Door Lock Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact MCC-H
E:14	Valve Solenoid overcurrent (> 2.1 to 4.4 amps)	Dead Condition	CTRL LED – On VALVE/DOOR LED – On	Contact MCC-H
E:15	120 V Supply overcurrent (7.0 to 14.6 amps)	Dead Condition	CTRL LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:17	V1 reference is too high (> 6.0 volts)	Dead Condition	CTRL LED – On	Contact MCC-H
E:18	V2 reference is too high (> 6.0 volts)	Overridable Condition	CTRL LED – On	Contact MCC-H
E:19	V1 reference is too low (< 4.0 volts)	Dead Condition	CTRL LED – On	Contact MCC-H
E:20	V2 reference is too low (< 4.0 volts)	Overridable Condition	CTRL LED – On	Contact MCC-H
E:21	Zero 1 reference is too high (> 1.0 volts)	Dead Condition	CTRL LED – On	Contact MCC-H
E:22	Zero 2 reference is too high (> 1.0 volts)	Overridable Condition	CTRL LED – On	Contact MCC-H
E:23	Zero 1 reference is too low (< -1.0 volts)	Dead Condition	CTRL LED – On	Contact MCC-H
E:24	Zero 2 reference is too low (< -1.0 volts)	Overridable Condition	CTRL LED – On	Contact MCC-H
E:25	+12 V too high (> 14.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:26	-12 V too high (> -10.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:27	+12 V too low (< 10.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:28	-12 V too low (< -14.0 volts)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:29	Upper Canister Indicator Solenoid voltage high (Solenoid feedback indicates it is on prior to completion of regeneration)	Dead Condition	CTRL LED – On	Contact MCC-H (Controller suspect)
E:30	Upper Canister Indicator Solenoid voltage low (Solenoid commanded on, but feedback indicates off)	Status Condition	CTRL LED – On	If no other errors present, no action. When regeneration complete, Canister state indicator will require manual actuation to the R position
E:31	Lower Canister Indicator Solenoid voltage high (Solenoid feedback indicates it is on prior to completion of regeneration)	Dead Condition	CTRL LED – On	Contact MCC-H (Controller suspect)
E:32	Lower Canister Indicator Solenoid voltage low (Solenoid commanded on, but feedback indicates off)	Status Condition	CTRL LED – On	If no other errors present, no action. When regeneration complete, Canister state indicator will require manual actuation to the R position
E:33	Watchdog never ready	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:34	Watchdog reset too wide	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:35	Fan RPM < 30,000 (15 seconds after start)	Dead Condition	CTRL LED – On FAN LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:36	Fan RPM > 30,000 < 40,000 (for 60 seconds)	Overridable Condition	CTRL LED – On FAN LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:37	Fan RPM > 60,000 (15 seconds after start)	Dead Condition	CTRL LED – On FAN LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:38	Fan > 60000 RPM (for 60 seconds)	Overridable Condition	CTRL LED – On FAN LED – On	Cycle sw POWER If error no longer present, continue with use Contact MCC-H
E:39	Fan did not turn off when commanded <u>NOTE</u> Fan is not nominally commanded off during a regeneration cycle. Abort only occurs if Regenerator was taken to STANDBY.	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and FAN LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:40	Heater overcurrent (> 6.2 to 12.8 amps)	Abort Condition (4-hour cooling mode initiated)	HEATER LED – On, CYCLE ABORT INITIATED LED – On, and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:41	Heater undervoltage when on (< 94.5)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – Blinking with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:42	Heater overvoltage when off (> 25 volts with Server On) (> 10 volts with Server Off)	Dead Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:43	Heater on after power server is off (> 25 volts with Server on) (> 10 volts with Server off)	Abort Condition (4-hour cooling mode initiated)	HEATER LED – Blinking with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H If no comm with MCC-H , sw POWER → OFF
E:44	Heater too slow (failed to bring temp up to set value after Standby mode within 6 hours)	Overridable Condition	HEATER LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:45	Door not indicating latched while regenerating	Overridable Condition	VALVE/DOOR LED – On	√Oven door closed and latched sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:46	Diverter Valve not in Cooling position when commanded	Overridable Condition	VALVE/DOOR LED – On	Contact MCC-H
E:47	Diverter Valve not in Heating position when commanded	Overridable Condition	VALVE/DOOR LED – On	Contact MCC-H
E:48	Diverter Valve position not at Limit default	Overridable Condition	VALVE/DOOR LED – On	Contact MCC-H
E:49	Diverter Valve indicates both Heating and Cooling position	Overridable Condition	VALVE/DOOR LED – On	Contact MCC-H
E:50	Internal Heater Temp Sensor invalid low (T1 < -30° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:51	Internal Heater Temp Sensor invalid low (T2 < -30° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:52	Internal Heater Temp Sensor invalid high (T1 > 600° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:53	Internal Heater Temp Sensor invalid high (T2 > 600° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:54	Internal Heater Temp Sensors invalid (T1 and T2 > 600° F or < -30° F)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:55	Internal Heater Temp Sensor overtemp (T1 > 475° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:56	Internal Heater Temp Sensor overtemp (T2 > 475° F)	Overridable Condition	CTRL LED – On HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:57	Internal Heater Temp Sensors overtemp (T1 and T2 > 475° F)	Abort Condition (4-hour cooling mode initiated)	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:58	Internal Heater Temp Sensor undertemp (T1 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:59	Internal Heater Temp Sensor undertemp (T2 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:60	Internal Heater Temp Sensors undertemp (T1 and T2 < 225° F after 2 hours heating)	Overridable Condition	HEATER LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:61	Internal Heater Temp Sensor undertemp (T1 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:62	Internal Heater Temp Sensor undertemp (T2 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:63	Internal Heater Temp Sensors undertemp (T1 and T2 < 290° F after 9.5 hours heating)	Overridable Condition	HEATER LED – On	Contact MCC-H
E:64	Internal Heater Temp Sensor delta out of range (T1 and T2 differ by > 16° to 27° F)	Overridable Condition	HEATER LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:65	Oven Temp Sensor invalid low (T8 < -30° F)	Overridable Condition	CTRL LED – On OVEN HOT LED – On	FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:66	Oven Temp Sensor invalid high (T8 > 440° F)	Overridable Condition	CTRL LED – On OVEN HOT LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:67	Upper and Lower Can Temp Sensors undertemp (T4 and T6 < 250° F after 4 hours heating, indicating low flow)	Overridable Condition	FLOW LED – On UPPER CAN LED - On LOWER CAN LED - On	√CO2 REMOVAL RECEPTACLE CO2 VALVE – REGEN √Airlock CCAA On Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

(ISS EVA SYS/7A - ALL/FIN 3) Page 10 of 14 pages

DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:68	Controller Watchdog failed (lost sync)	Abort Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:69	Controller Watchdog failed (out of sync)	Abort Condition	CTRL LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:70	External Heater Temp Sensor overtemp (T3 > 525° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:71	External Heater Temp Sensor invalid low (T3 < -30° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H
E:72	External Heater Temp Sensor invalid high (T3 > 570° F)	Abort Condition	CTRL LED – On and HEATER LED – On with: CYCLE ABORT INITIATED LED – On and REGENERATE COOLING LED – On, followed by CYCLE ABORT COMPLETE LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:73	Upper Canister Outlet Temp Sensor invalid low (T4 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:74	Upper Canister Outlet Temp Sensor invalid low (T5 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:75	Upper Canister Outlet Temp Sensor invalid high (T4 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:76	Upper Canister Outlet Temp Sensor invalid high (T5 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:77	Upper Canister Outlet Temp Sensors invalid (T4 and T5 > 570° F or <-30°F)	Overridable Condition	TEMP LED – On	Contact MCC-H
E:78	Upper Canister Outlet Temp Sensor undertemp (T4 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:79	Upper Canister Outlet Temp Sensor undertemp (T5 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:80	Upper Canister Outlet Temp Sensors undertemp (T4 and T5 < 250° F between 4 to 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:81	Upper Canister Outlet Temp Sensor no heat spike (T4 < 300° F after 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:82	Upper Canister Outlet Temp Sensor no heat spike (T5 < 300° F after 10 hours heating)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:83	Upper Canister Outlet Temp Sensors no heat spike (T4 and T5)	Status Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:84	Upper Canister too slow (failed to bring temp up to set value after standby mode within 6 hours)	Overridable Condition	UPPER CAN LED – On	Ignore for single Canister regeneration or contact MCC-H
E:85	Lower Canister Outlet Temp Sensor invalid low (T6 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:86	Lower Canister Outlet Temp Sensor invalid low (T7 < -30° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:87	Lower Canister Outlet Temp Sensor invalid high (T6 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:88	Lower Canister Outlet Temp Sensor invalid high (T7 > 570° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:89	Lower Canister Outlet Temp Sensors invalid high (T6 and T7 > 570° F or < -30° F)	Overridable Condition	TEMP LED – On	Contact MCC-H
E:90	Lower Canister Outlet Temp Sensor undertemp (T6 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H
E:91	Lower Canister Outlet Temp Sensor undertemp (T7 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H
E:92	Lower Canister Outlet Temp Sensors undertemp (T6 and T7 < 250° F between 4 to 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H
E:93	Lower Canister Outlet Temp Sensor no heat spike (T6 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H
E:94	Lower Canister Outlet Temp Sensor no heat spike (T7 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H
E:95	Lower Canister Outlet Temp Sensors no heat spike (T6 and T7 < 300° F after 10 hours heating)	Status Condition	LOWER CAN LED – On	Contact MCC-H

2.235 METOX REGENERATOR TROUBLESHOOTING

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DISPLAY ERROR CODE	CAUSE DESCRIPTION	IMPACT	FAULT INDICATORS	CREW ACTION
E:96	Lower Canister too slow (failed to bring temp up to set value after Standby mode within 6 hours)	Overridable Condition	LOWER CAN LED – On	Contact MCC-H
E:97	Upper Canister Outlet Temp Sensor delta out of range (T4 and T5 differ by > 17° to 27° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:98	Lower Canister Outlet Temp Sensor delta out of range (T6 and T7 differ by > 17° to 27° F)	Overridable Condition	TEMP LED – On	sw FAULT OVERRIDE → ON √FAULT OVERRIDE ON LED – On Contact MCC-H
E:99	Oven Temp Sensor indicates hot at end of cooling cycle (T8 > 105° F)	Overridable Condition	FLOW LED – On OVEN HOT LED – On	<div style="border: 2px solid black; padding: 5px; text-align: center;"> CAUTION Canisters may be hot. </div> Open Oven door using MANUAL OVERRIDE. Check for excess heat in oven Contact MCC-H

2.250 UIA ACTIVATION AND CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 1 of 2 pages

I

1. VERIFYING O2 SYSTEM CONFIGURED

PCS Airlock: ECLSS: O2 Hi P Supply Vlv

AL O2 Hi Pressure Supply Valve

cmd Open

Verify Actual Position – Open

2. √Helmet ←|→ HUT

UIA 3. √OXYGEN EMU1,2 vlv (two) – CLOSE

√EMU O2 SUPPLY PRESS gauge ~850 psi

DCM 4. √STATUS: O2 P XXX

Record O2 P.

EMU	O2 P

If O2 P > 700, then:

5. O2 ACT → PRESS

When O2 P ~700:

6. O2 ACT → OFF

7. √STATUS: O2 P XXX

Record O2 P.

EMU	O2 P

UIA 8. OXYGEN EMU1(2) vlv → OPEN

DCM 9. STATUS: O2 P XXX

10. Continue charge until O2 P ~850.

11. √STATUS: O2 P XXX

Record O2 P.

EMU	O2 P

UIA 12. OXYGEN EMU1(2) vlv → CLOSE

2.250 UIA ACTIVATION AND CHECKOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 2 of 2 pages

- UIA 13. sw PWR EV-1(2) → OFF
- √PWR EV-1(2) LEDs (four) – ■
√PWR EV-1(2) VOLTS: ~00.0
14. Swap SCUs.
- DCM 15. PWR → BATT
- PSA 16. sw SUIT SELECT → EMU 2
- UIA 17. sw PWR EV-2 → ON
- √PWR EV-2 EMU LED – □
√PWR EV-2 VOLTS: 18.0 to 19.0
- DCM 18. PWR → SCU
19. Repeat steps 4 to 13 on SCU 2.
- UIA 20. √sw PWR EV-1,2 (two) – OFF
- PSA 21. sw SUIT SELECT (two) → OFF
- √SUIT SELECT LEDs (four) – ■
22. sw MAIN POWER → OFF
- √MAIN POWER LED – ■
- DCM 23. SCU 2 ←|→ DCM
- Install DCM cover.
- C-Lk 24. Insert SCU 2 in stowage pouch.
Wall
25. Install helmet as required.
- PCS 26. [RECONFIGURING O2 SYSTEM](#)
Airlock: ECLSS: O2 Hi P Supply Vlv

AL O2 Hi Pressure Supply Valve
- cmd** Close
- Verify Actual Position – Close

(5 Minutes)

OBJECTIVE:

This procedure is used to suspend temporarily the Metox Regenerator heating cycle to conserve power.

- Metox
Regen
1. sw MODE → STANDBY
 2. √STANDBY LOCAL LED – On
√TIME REMAINING display – holding

CAUTION

Metox Canisters should not be left in oven after regeneration or after the completion of a cycle abort.

NOTE

If the standby phase exceeds 6 hours, regeneration is aborted and a 4 hr cooling cycle is initiated. (The CYCLE ABORT INITIATED LED will illuminate, followed by the CYCLE ABORT COMPLETE LED. The TIME REMAINING display will flash 'E:06'.)

When Standby no longer required

3. sw MODE → REGENERATE
4. √STANDBY LOCAL LED – Off
√REGENERATE HEATING LED – On

NOTE

The TIME REMAINING display will not decrease until the canister has reached the temperature it was at prior to standby initiation.

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OVERNIGHT CAMPOUT

	<u>GND</u>	<u>ISS</u>
2.305 10.2 PSIA CAMPOUT MASK PREBREATHE.....	343	MPV
2.310 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT	349	MPV
2.311 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT - MANUAL PRESSURE CONTROL.....	351	MPV
2.315 HYGIENE BREAK	355	MPV
2.320 10.2 PSIA CAMPOUT EVA PREP	363	MPV

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(65 Minutes)

OBJECTIVE:

This procedure is performed as part of the EVA Campout prebreathe protocol. It will be performed the night prior to the EVA and includes the steps for mask prebreathe and 10.2 psia airlock depress.

1. Verify with **MCC-H** that {[1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION](#)}, steps 1 to 7 (SODF: ISS EVA SYS: 10.2 PSIA OPS) are complete, then:

2. Take one aspirin tablet (325 mg).

- PHA 3. ✓PHA (two) configured per Figure 1



Figure 1.- Prebreathe Hose Assembly (PHA) Configuration.

- A/L1D2 4. PHAs →|← PHA ports

- ATU4,5 5. [CONFIGURING FOR ONBOARD PHA COMM \(as required\)](#)

- 5.1 EACP Y-Cable ←|→ ATU 4,5

- 5.2 PHA comm cables →|← Headset Control Unit (HCU)
✓HCU →|← HCU Extension Cable

- 5.3 HCU Extension Cable →|← ATU 4,5

- 5.3 HCU → PTT (to alleviate noise)

- 5.4 pb PTT → Press
pb 5 → Press

- ATU4,5,6 5.5 ✓Display – '5T' and other loops as required
✓Display PTT

WARNING

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

- PHA
6. Verify black plates in top of Quick Don Mask are seated in silicon.
 7. Don Quick Don Mask.
 8. Quick Don Mask O2 control → EMERGENCY
 9. Momentarily pull mask away from face.

√O2 flow

10. Record mask P/B initiate GMT and start timer.
Continue mask prebreathe for 60 minutes.

GMT (MASK P/B INIT) ____/____:____ PET = 00:00

11. VERIFYING AIRLOCK EQUIPMENT

- 11.1 √PFE located in PFE locker
√Pressure gauge needle is in green zone (800 to 900 psig)
- 11.2 √Three PHA Quick Don Masks available to support EVA Prep
- 11.3 √PBA bottles and Quick Don Masks located in Airlock for every isolated crewmember
√PBA Bottles →|← Quick Don Masks for each non-EVA crewmember in the airlock
√Oxygen bottle pressure gauge needle ≥ 3000 psig for each bottle
- 11.4 √Two CSA-CPs located in Airlock
√Battery power for both CSA-CPs

- AL10A1
- 11.5 √Flexible Vent Duct attached to the Conditioned Air Supply connection

- 11.6 Set up and activate one PCS in the Airlock.
√SSC located in the Airlock

12. ACTIVATING AIRLOCK CO2 REMOVAL

- 12.1 Unstow new Metox canisters (two) and report barcodes to **MCC-H**.
- 12.2 Remove Metox canister caps and stow in EMU Equipment Bag.

- A/L1A1
- 12.3 Open CO2 Removal Receptacle door.

12.4 ✓CO2 VALVE – REMOVAL

12.5 Install Metox canisters in CO2 Removal Receptacle per label on closeout.

12.6 Close and latch CO2 Removal Receptacle door.

13. Stow food, drink, sleeping bag, and sleeping kit in airlock for all campout crewmembers.

14. CLOSING NODE 1 STBD HATCH

NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

When P/B PET = 45 minutes

14.1 ✓**MCC-H** for Go to continue

14.2 ✓Node 1 Stbd Hatch MPEV – CLOSED and uncapped

14.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

WARNING

Do not initiate depress until 45 minutes of mask prebreathe complete.

15. DEPRESSING TO 10.2 PSIA

15.1 Momentarily pull mask away from face to verify positive O2 flow.

* If no positive O2 flow, contact **MCC-H**.

UIA 15.9 ✓DEPRESS PUMP ENABLE LED – On

UIA 15.10 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk 15.11 DEPRESS PUMP MAN ISOV → OPEN

✓Cab Press – Decreasing (use vacuum manometer or PCS)

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

When Cab Press < 14.1 psia (729 mmHg)

15.13 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

15.14 Crank Handle – Stowed Position

NOTE

1. CSA-CP % O₂ will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

15.15 Monitor O₂ using CSA-CP during depress.
Refer to Figure 2.

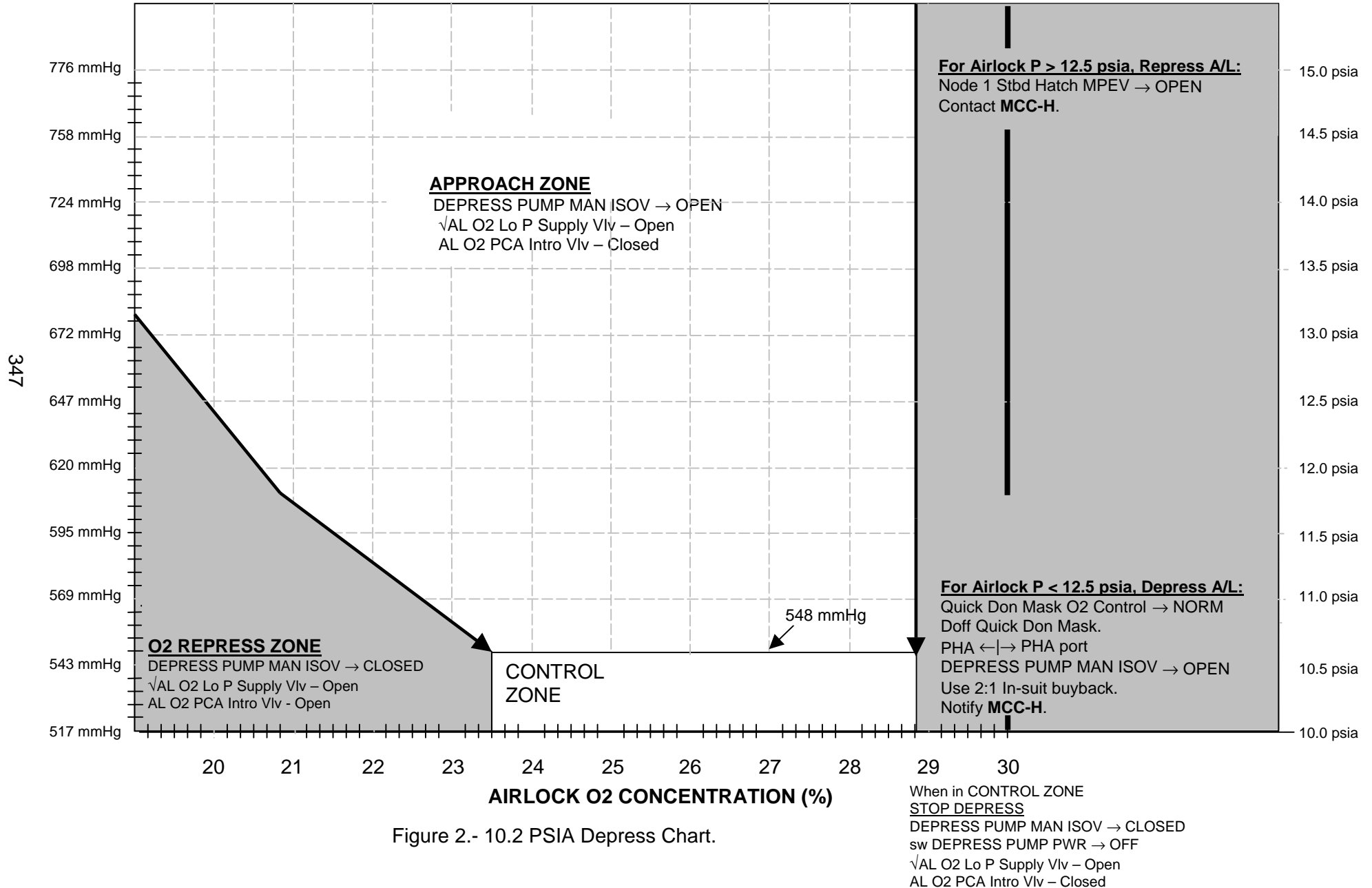


Figure 2.- 10.2 PSIA Depress Chart.

2.305 10.2 PSIA CAMPOUT MASK PREBREATHE

(ISS EVA SYS/7A - ALL/FIN 3)

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- C-Lk When Airlock is at 10.2 psia (527 mmHg)
- 15.16 DEPRESS PUMP MAN ISOV → CLOSED
- 15.17 Verify O2 is between 23.5 % and 28.8 % with a target range of 27.0% to 28.0%
- UIA 15.18 sw DEPRESS PUMP PWR → OFF
- MCC-H/** 16. Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION},
IV steps 8 and 9 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

WARNING

Do not terminate prebreathe until cabin pressure at 10.2 psia and 60-minute mask prebreathe completed.

- PHA 17. Quick Don Mask O2 control → NORMAL

Record mask P/B terminate time.

GMT (MASK P/B TERM) ____/____:____ ____

18. Doff Quick Don Mask.

- A/L1D2 19. PHA ←|→ PHA port

Install cap on PHA port.

- PHA 20. Depress Quick Don Mask O2 control to bleed down line.
Install caps on PHA fittings.

21. Clean PHA Quick Don Masks with dry wipes from EMU Servicing Kit.

22. DECONFIGURING ONBOARD PHA COMM (as required)

- ATU4,5 22.1 HANG UP pb → Press
5 pb → Press

√Display – blank

- 22.2 PHA comm cable ←|→ Headset Control Unit (HCU)

- 22.3 HCU Extension Cable ←|→ ATU 4,5

- 22.4 EACP Y cable →|← ATU 4,5

23. Stow PHA Quick Don Mask in PHA bag.

2.310 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT I

(ISS EVA SYS/8A - ALL/FIN 3) Page 1 of 2 pages

OBJECTIVE:

This procedure will set up automatic pressure composition control in the airlock for overnight campout. **MCC-H** will perform this procedure when the Airlock is at 10.2 psia (527 mmHg) immediately following {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}.

1. PREREQUISITE CHECKS

PCS

1.1 US Lab: ECLSS: AR Rack

LAB AR Rack Overview
'MCA'

√State – Operate

1.2 sel MCA

Lab MCA
'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating every 10 seconds

√Sample Location – Airlock

Verify O2 is between 24.0 % and 28.8 % with a target range of 27 % to 28.0 %.

1.3 Airlock: ECLSS: PCA

AL ACS

√Primary PCA – LAB-Airlock (None-Airlock)

'Pressure Control Assembly'

√State – Monitor

√Status – Ops

1.4 Airlock: ECLSS: Oxygen System

AL Oxygen System

'O2 Low Pressure Supply Valve'

√Actual Position – Open

'Low Pressure'

√PCA O2 Line Press: 689 to 930 kPa (100 to 135 psia)

1.5 Airlock: ECLSS: Nitrogen System

AL Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

√PCA N2 Line Press: 689 to 930 kPa (100 to 135 psia)

2.310 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA CAMPOUT

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2. ENABLING AIRLOCK PRESSURE COMPOSITION CONTROL

PCS Airlock: ECLSS: PCA: PCA Commands

AL PCA Commands

'Press Composition Control'

cmd Enable (√Airlock ACS State – Comp Control)

3. ENABLING AIRLOCK ALARMS

PCS C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Execute

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Execute

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

cmd Execute

4. DISABLING THE DEPRESS PUMP

PCS Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

cmd RPC Position – Open (√ – Op)

2.311 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA

CAMPOUT - MANUAL PRESSURE CONTROL

(ISS EVA SYS/8A - ALL/FIN 3) Page 1 of 3 pages

OBJECTIVE:

This procedure will be performed by the ground to manually control oxygen and nitrogen pressures in the airlock. **MCC-H** will perform this procedure when the Airlock is at 10.2 psia (527 mmHg) immediately following 1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION. The MCA must be fully functional for partial pressure monitoring.

1. PREREQUISITE CHECKS

PCS

1.1 US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'MCA'

√State – Operate

1.2 sel MCA

LAB MCA

'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating every 10 seconds

√Sample Location – Airlock

Verify O₂ is between 24.0 % and 28.8 % with a target range of 27 % to 28.0 %.

1.3 Airlock: ECLSS: PCA

AL ACS

√Primary PCA – LAB-Airlock

'Pressure Control Assembly'

√State – Monitor

√Status – Ops

1.4 Airlock: ECLSS: Oxygen System

AL Oxygen System

'O₂ Low Pressure Supply Valve'

√Actual Position – Open

'Low Pressure'

√PCA O₂ Line Press: 689 to 930 kPa (100 to 135 psia)

2.311 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA

CAMPOUT - MANUAL PRESSURE CONTROL

(ISS EVA SYS/8A - ALL/FIN 3) Page 2 of 3 pages

1.5 Airlock: ECLSS: Nitrogen System

AL Nitrogen System

'N2 Supply Valve'

√Actual Position – Open

√PCA N2 Line Press: 689 to 930 kPa (100 to 135 psia)

2. [ENABLING AIRLOCK ALARMS](#)

2.1 [Inhibit C&Ws](#)

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Execute

input Event Code – 6 7 0 3 (AL1A1 CCAA Inoperative-A/L)

cmd Execute

2.2 [Suppress Caution](#)

Caution & Warning Summary

'Event Code Tools'

sel Suppress

Suppress Annunciation of an Event

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Arm

cmd Execute

3. [DISABLING THE DEPRESS PUMP](#)

PCS

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

cmd RPC Position – Open (√ – Op)

2.311 AIRLOCK CONFIGURATION FOR OVERNIGHT 10.2 PSIA

CAMPOUT - MANUAL PRESSURE CONTROL

(ISS EVA SYS/8A - ALL/FIN 3) Page 3 of 3 pages

WARNING

Oxygen concentration and total pressure in the Airlock must be monitored regularly throughout crew sleep. Total pressure should be maintained between 517 mmHg (10.0 psia) and 538 mmHg (10.4 psia). Oxygen concentration should be maintained between 24.0 % and 28.8 %.

4. MONITORING OXYGEN AND TOTAL PRESSURE LEVELS

4.1 Airlock: ECLSS

Airlock: ECLSS

Verify Cab Press is between 517 mmHg (10.0 psia) and 538 mmHg (10.4 psia).

Verify ppO₂ is between 24.0 % and 28.8 %.

If ppO₂ < 24.0 %

4.2 sel Oxygen System

AL Oxygen System

'AL PCA O₂ Intro Valve'

cmd Open (√Position – Open) until ppO₂ ≥ 26.0% or total pressure > 538 mmHg (10.4 psia)

4.3 **cmd** Close (√Position – Closed)

If Cab Press < 522 mmHg (10.1 psia) and ppO₂ > 28.5 %

4.4 sel Nitrogen System

AL Nitrogen System

'AL PCA N₂ Intro Valve'

cmd Open (√Position – Open) until Cab Press ≥ 527 mmHg (10.2 psia)

4.5 **cmd** Close (√Position – Closed)

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2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 1 of 8 pages

I

(70 Minutes)

OBJECTIVE:

This procedure allows the campout crewmembers to repress the airlock for required hygiene activities and to allow additional crewmembers in the airlock. The EV crew cannot initiate repress until at least 8:40 have been spent at 10.2 psi and then must spend 70 minutes on PHA Quick Don Masks.

NOTE

MCC-H will nominally perform steps 1 to 4 from the ground prior to repressing the Airlock to 14.7 psia. Steps 1 and 3 do not need to be performed if manual pressure composition control is being used.

MCC-H/IV
PCS

1. INHIBITING AIRLOCK PRESSURE COMPOSITION CONTROL

Airlock: ECLSS: PCA: PCA Commands

AL PCA Commands

'Press Composition Control'

cmd Inhibit

√Airlock ACS State – Monitor

PCS

2. INHIBITING AIRLOCK ALARMS

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Arm

cmd Execute

input Event Code – 6 4 6 1 (MCA ppO2 Approaching Limits)

cmd Arm

cmd Execute

input Event Code – 6 5 7 5 (RAPID DEPRESS -LAB)

cmd Arm

cmd Execute

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 2 of 8 pages

NOTE

Per SPN 2562, the PCS rapid sample commands will not work (12A to 15A). The rapid sample commands must be built by the ground.

3. MCA CONFIGURATION

- 3.1 Perform {1.203 BUILD COMMAND FROM TEMPLATE}, all (SODF: GND: C&DH: NOMINAL) to build Rapid Sample Template <LAEA96IM0472K>, then:

input Sequence Item 1 – 6 (Airlock)

cmd <Cmd Inv: LAB_MCA_Rpd_Smpl_Tmplt - (LAEA96IM0472K)>

PCS

- 3.2 US Lab: ECLSS: AR Rack: MCA

LAB MCA

'(ORU 2) Mass Spectrometer Assembly'

√Sample Time – updating every 2 seconds onboard or every 10 seconds on the ground

√Sample Location – Airlock

PCS

4. INHIBITING ISS RAPID DEPRESS RESPONSE AND ALARM

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

cmd Inhibit Arm (√ – Armed)

cmd Inhibit (√Status – Inhibited)

'CC MDM Rapid Depress Response'

cmd Inhibit Arm (√ – Armed)

cmd Inhibit (√Status – Inhibited)

- 4.1 Inhibiting CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

- 4.2 √**MCC** to verify Russian Segment Rapid Depress Response inhibited

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 3 of 8 pages

MASK PREBREATHE INITIATION

EV1,2 A/L1D2 5. Relief Valve of PHA →|← PHA port

WARNING

Positive mask O2 pressure and fit are necessary to ensure adequate prebreathe.

6. Verify black plates in top of Quick Don Mask are seated in silicon.

7. Don Quick Don Mask.

PHA 8. Quick Don Mask O2 control → EMERGENCY

9. Momentarily pull mask away from face.

√O2 flow

10. Record mask P/B initiate time and continue mask prebreathe for 70 minutes.

GMT (MASK P/B INIT: HYGIENE) ____/____:____ ____

WARNING

1. Do not initiate airlock repress until 8:40 at 10.2 psi.
2. Do not terminate prebreathe until airlock pressure is back at 10.2 psia (527 mmHg) and 70 minutes of hygiene prebreathe completed.

REPRESSING AIRLOCK TO 14.7 PSIA

11. Node 1 Stbd Hatch MPEV → Open
Expect airlock repress to take approximately 7 minutes.

12. Open Node 1 Stbd Hatch per decal.

13. ENABLING ISS RAPID DEPRESS RESPONSE AND ALARM

MCC-H,IV

US Lab: ECLSS

Lab: ECLSS

Wait until $|dP/dT| < 0.04$ mmHg/min, then:

13.1 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

cmd Enable (√Status – Enabled)

'CC MDM Rapid Depress Response'

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 4 of 8 pages

cmd Enable (√Status – Enabled)

13.2 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code – 6 5 7 5 (RAPID DEPRESS – LAB)

cmd Execute

13.3 Enabling CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Enable'

cmd Enable (√Status – Enabled)

MCC-H,IV

14. INHIBITING A/L RAPID DEPRESS RESPONSE AND ALARM

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Rapid Depress Response – INT MDM'

cmd Inhibit – Arm (√Status – Armed)

cmd Inhibit

√Airlock Depress Response–INT MDM Status – Inhibited

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Arm

cmd Execute

PCS

15. CONFIGURING THE DEPRESS PUMP

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

√Close Cmd – Ena

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 5 of 8 pages

cmd RPC Position – Close (Verify – CI)

WARNING

When dragging PHA hoses through hatches, ensure QDs are within 3 feet of each Hatch.

NOTE

During the period that airlock is at 14.7 psi, IV crew can perform PREP FOR DOWNING steps in {2.320 10.2 PSIA CAMPOUT EVA PREP} (SODF: ISS EVA SYS: OVERNIGHT CAMPOUT) in advance.

EV1,2 16. Perform necessary hygiene activities.

17. Retrieve breakfast.

IV, EV1, EV2 18. Ingress Airlock.

IV 19. CLOSING NODE 1 STBD HATCH

NOTE

Be prepared to initiate depress within 5 minutes of closing the Node 1 Stbd Hatch to prevent high O2 concentrations in the Airlock.

19.1 ✓ **MCC-H** for Go to continue

19.2 ✓ Node 1 Stbd Hatch MPEV – CLOSED and uncapped

19.3 Check hatch seal and close Node 1 Stbd Hatch per decal (omit last step of decal).

20. DEPRESSING TO 10.2 PSIA

20.1 Momentarily pull mask away from face to verify positive O2 flow.

* If no positive O2 flow, contact **MCC-H**.

UIA 20.2 ✓ DEPRESS PUMP ENABLE LED – On

UIA 20.3 sw DEPRESS PUMP PWR → ON

Wait 10 seconds.

C-Lk 20.4 DEPRESS PUMP MAN ISOV → OPEN

✓ Cab Press – Decreasing (use vacuum manometer or PCS)

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 6 of 8 pages

PCS

Airlock: ECLSS

Airlock: ECLSS

'Equipment Lock'

When Cab Press <14.1 psia (729 mmHg)

20.5 Turn Hatch handle in the UNLATCH direction approximately 1.5 turns to place the Hatch in the equalize position (orange stripe).

20.6 Crank Handle – Stowed Position

NOTE

1. CSA-CP % O₂ will read approximately 1 % lower than actual during depress. Stable Airlock pressure is needed to obtain an accurate reading.
2. Per SPN 2563 (12A to 20A), each MCA partial pressure reading of the Airlock will be 86 seconds old before the depress begins, and will increase up to 99 seconds old at 10.2 psia.

20.7 Monitor O₂ using CSA-CP during depress.
Refer to Figure 1.

2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 7 of 8 pages

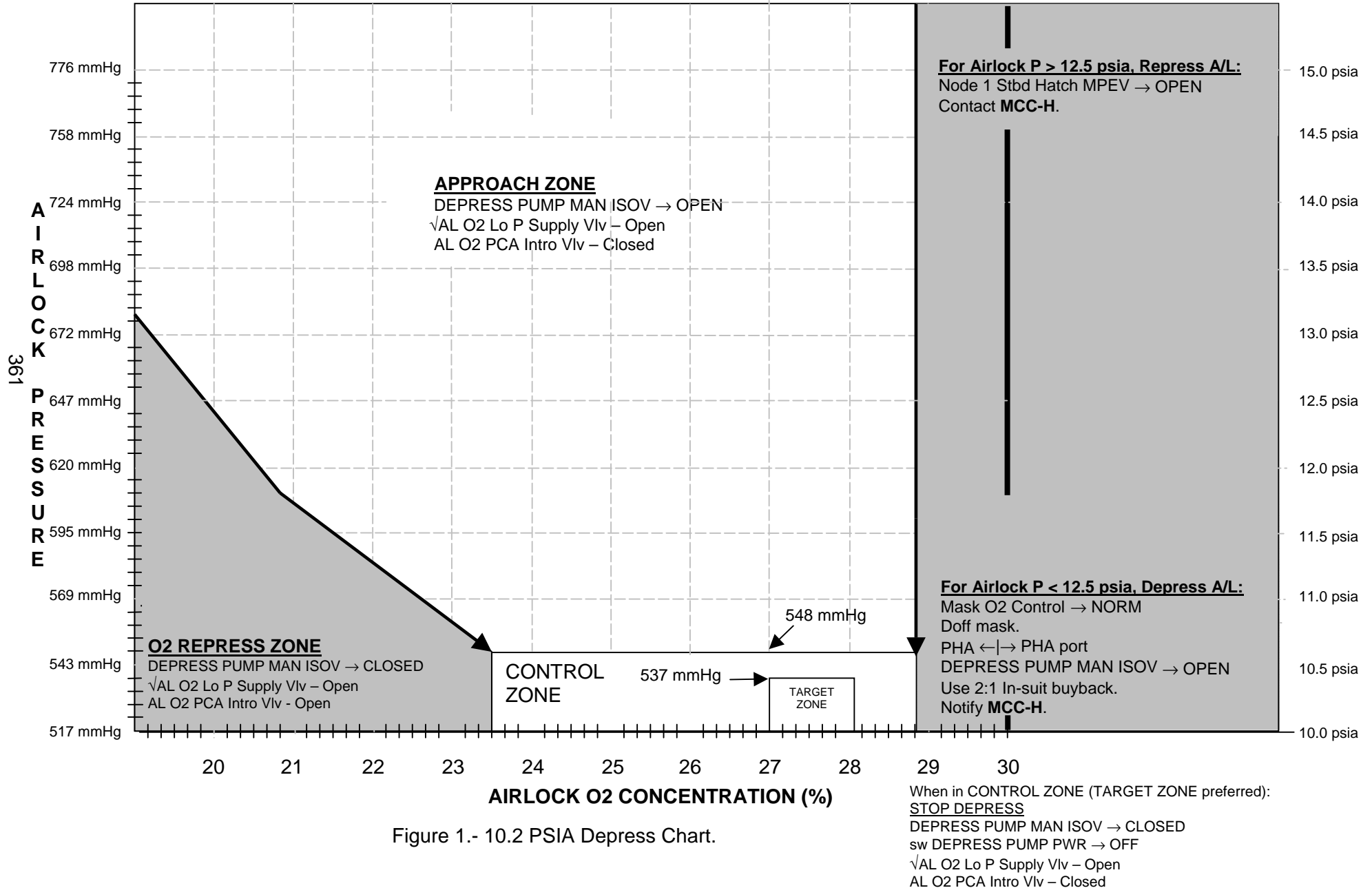


Figure 1.- 10.2 PSIA Depress Chart.

19 APR 05

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2.315 HYGIENE BREAK

(ISS EVA SYS/7A - ALL/FIN 5/SPN) Page 8 of 8 pages

- When Airlock is at 10.2 psia (527 mmHg)
- C-Lk 20.8 DEPRESS PUMP MAN ISOV → CLOSED
- 20.9 Verify O2 is between 23.5 % and 28.8 %.
- UIA 20.10 sw DEPRESS PUMP PWR → OFF
- MCC-H/IV 21. Perform {1.105 ISS AIRLOCK 10.2 PSIA OPERATIONS INITIATION}, step 8 (SODF: ISS EVA SYS: 10.2 PSIA OPS), then:

WARNING

Do not terminate prebreathe until Airlock pressure at 10.2 psia (527 mmHg) and 70 minutes hygiene prebreathe completed.

When 70 minutes of hygiene prebreathe complete and Airlock at 10.2 psia (527 mmHg)

22. Record Mask P/B terminate time
- GMT (MASK P/B TERM: HYGIENE) ____/____:____ ____
- PHA 23. Quick Don Mask O2 control → NORMAL
24. Doff Quick Don Mask.
- A/L1D2 25. Relief Valve of PHA ←|→ PHA port
- Install cap on PHA port, Relief Valve.
- PHA 26. Stow PHA Quick Don Mask in PHA Bag.

(90 Minutes)

OBJECTIVE:

This procedure is performed after 2.315 Hygiene Break to power up and don the EMUs. It assumes that the campout prebreathe protocol is used.

PREP FOR DONNING (30 MINUTES)

1. EVA COMM CONFIG

- | | |
|-----------------|---|
| MCC-H/IV | 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:

1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then: |
| STS IV | If orbiter docked
1.3 Perform shuttle EVA COMM CONFIG, all (FDF: EVA: EVA PREP), then: |

2. EMU POWERUP

- | | | | |
|---|--|----------------|---|
| EV-1,2
UIA | 2.1 √sw UIA PWR EV-1,2 (two) – OFF
√UIA PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: 850 to 950 | | |
| C-Lk
wall | 2.2 Remove SCU from stowage straps and pouches. Transfer SCU to E-Lk. | | |
| DCM | 2.3 Open DCM Cover.
Affix cover with Velcro to DCM.

2.4 SCU → ← DCM

√SCU locked | | |
| DCM | 2.5 sw POWER → BATT | | |
| <table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="background-color: yellow; padding: 5px;">CAUTION</td> </tr> <tr> <td style="padding: 5px;">EMU must be on BATT power when UIA suit power is turned on.</td> </tr> </table> | | CAUTION | EMU must be on BATT power when UIA suit power is turned on. |
| CAUTION | | | |
| EMU must be on BATT power when UIA suit power is turned on. | | | |
| PSA | 2.6 √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU1,2 (two) – PWR

2.7 sw MAIN POWER → ON

√MAIN POWER LED – On | | |

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 2 of 7 pages

2.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

UIA 2.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM 2.10 sw POWER → SCU

2.11 √STATUS: BATT VDC ≥ 20.3

UIA 3. OXYGEN EMU1,2 vlv (two) → OPEN

☐☐☐ 4. Waist ring ←|→ HUT

Temporarily stow LTA.

Remove Multiple Water Connector cover.

☐☐☐ 5. Helmet ←|→ HUT

Temporarily stow helmet.

☐☐☐ 6. Remove Dosimeter from inflight garments.
Insert Dosimeter in LCVG left leg pocket.

☐☐☐ 7. If necessary, apply Medical Kit items. As required, refer to {5.110
[APPROVED NON-EMU HARDWARE MATRIX](#)}, all (SODF: ISS
EVA SYS: REFERENCE).

☐☐☐ 8. Don MAG, TCU, LCVG, biomed.

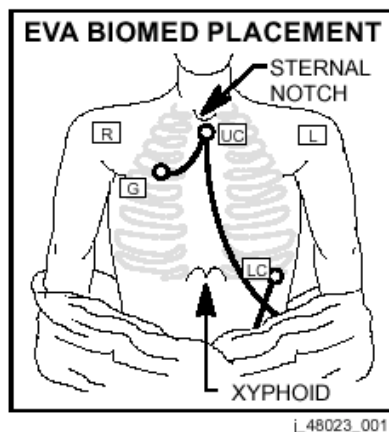


Figure 1.- Nondisposable Biomed Configuration.

☐☐☐ 9. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner

Biomed pigtail →|← electrical harness

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 3 of 7 pages

- ☐☐☐ 10. Don comm cap.

NOTE

Due to an RF interference issue between the hand-held mics and the EMU radios, the hand-held mic should not be used in the vicinity of powered EMU radios.

- DCM ☐☐☐ 11. sw COMM mode → PRI

- ☐☐☐ 12. √sw Comm FREQ – LOW

- ☐☐☐ 13. Verify biomed, EMU data, RF comm with **MCC-H**.

- EV1,2 DCM ☐☐☐ 14. sw COMM mode → HL

- ☐☐☐ 15. Doff comm cap.

- ☐☐☐ 16. Biomed pigtail ←|→ electrical harness

- ATU ☐☐☐ 17. √EACP y-cable →|← ATUs
4,5

- EACP ☐☐☐ 18. √EACP y-cable →|← EACP

sw PWR → ON

√EMU 1,2 mode sel (two) – DUAL

- ATU ☐☐☐ 19. pb PTT → Press
4,5,6 pb 1 → Press (Big Loop)
pb 3 → Press (Shuttle/ISS ICOM)
pb 5 → Press (Airlock)

√Display – ‘**1G, 3, 5T**’ and other loops, as required

√Display – ‘**DUAL**’

EMU DONNING (55 MINUTES)

NOTE

May be performed by EV1 and EV2 simultaneously.

- ☐☐☐ 20. √EDDA latched

- EV1,2 ☐☐☐ 21. Take one aspirin tablet (325 mg), if not taken previously.

- EV1 DCM ☐☐☐ 22. √STATUS: SOP P: 5410 to 6800 (compare with gauge)

- ☐☐☐ 23. √Waist ring – open

- ☐☐☐ 24. Don LTA (attach donning handles as required).

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 4 of 7 pages

If boot bladder manipulation required

25.1 Boot $\leftarrow| \rightarrow$ Leg (sizing ring)

25.2 Pull up excess boot bladder around full circumference of boot disconnect.

WARNING

Keep bladder material clear of threads during reconnection of boot.

25.3 Boot $\rightarrow| \leftarrow$ Leg (sizing ring)

25.4 Lock 1 \rightarrow LOCK

✓All locks (three per boot) are engaged

☐☐☐ 26. ✓Suit arms aligned

☐☐☐ 27. ✓Gloves $\leftarrow| \rightarrow$ EMU
✓Wrist disconnects – open

☐☐☐ 28. Stow IV glasses as required.

☐☐☐ 29. Don thumb loops.

☐☐☐ 30. ✓Drink vlv position

☐☐☐ 31. ✓Biomed connector is outside of HUT

☐☐☐ 32. Don HUT.

☐☐☐ 33. Release thumb loops.

☐☐☐ 34. ✓Suit arms aligned

☐☐☐ 35. Don EV glasses as required.
Don comm cap.

☐☐☐ 36. ✓Comm

☐☐☐ 37. Biomed pigtail $\rightarrow| \leftarrow$ electrical harness

☐☐☐ 38. LCVG $\rightarrow| \leftarrow$ Multiple Water Connector

✓Multiple Water Connector locked

☐☐☐ 39. ✓Thermal cover clear of waist ring

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 5 of 7 pages

☐☐☐ 40. Waist ring → engage position

☐☐☐ 41. Waist ring →|← HUT

√Waist ring locked

☐☐☐ 42. Remove donning handles.
Stow donning handles in EMU Equipment Bag.
Cover waist ring.

CAUTION

Pulling on blue bite valve to adjust position
can cause valve to release from stem.

☐☐☐ 43. √Drink vlv position

☐☐☐ 44. √Mic boom position

☐☐☐ 45. Don comfort gloves, wristlets.

☐☐☐ 46. Wrist rings → engage position

☐☐☐ 47. Don EV gloves.

√EV gloves locked

☐☐☐ 48. Tighten palm restraint straps.

☐☐☐ 49. √sw Glove heater (two) – OFF

☐☐☐ 50. √sw REBA – OFF (toward left arm of suit)

☐☐☐ 51. Lower arm power harness cables →|← Gloves

Stow slack under arm TMG.

☐☐☐ 52. √Cuff C/L position
√Wrist mirrors installed

CAUTION

Flexible Ventilation Duct must be removed from
Crewlock prior to taking EMU fan to ON to avoid
ice formation on UIA water lines.

☐☐☐ 53. Rotate Flexible Ventilation Duct out of C-Lk.

CAUTION

Minimize fan operation with O2 ACT – OFF (~2 minutes).

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 6 of 7 pages

DCM ☐☐☐ 54. sw FAN → ON

☐☐☐ 55. √Electrical harness clear of neck ring

☐☐☐ 56. Don helmet.

√Helmet locked

DCM ☐☐☐ 57. O2 ACT → IV

☐☐☐ 58. √Helmet purge vlv – closed, locked

DCM ☐☐☐ 59. PURGE vlv → closed (down)

If EMU TV capability

☐☐☐ 60. Unstow EMU TV power cable.

☐☐☐ 61. EMU TV power cable ←|→ Ground plug

☐☐☐ 62. EMU TV power cable →|← EMU TV

EV2 ☐☐☐ 63. Repeat steps 19 to 61 if donning performed serially.

EMU CHECK (5 MINUTES)

BOTH ☐☐☐ 64. √Cooling

* If cooling insufficient

* | Slowly cycle Temperature Control Valve between 7 and
* | Max C while IV depresses and holds pump priming
* | valve on back of EMU (30 seconds minimum).

DCM ☐☐☐ 65. Temp control vlv → as required

☐☐☐ 66. √Wrist rings – covered

☐☐☐ √Waist rings – covered

☐☐☐ √sw WATER – OFF

☐☐☐ √sw POWER – SCU

☐☐☐ √sw FAN – ON

☐☐☐ √sw Comm FREQ – LOW

☐☐☐ √Helmet lights – Operational

☐☐☐ √Helmet purge vlv – closed, locked

DCM ☐☐☐ √PURGE vlv – closed (down)

NOTE

During leak check, when **SET O2 IV** message displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

2.320 10.2 PSIA CAMPOUT EVA PREP

(ISS EVA SYS/7A - ALL/FIN 3/HC) Page 7 of 7 pages

- ☐☐☐ 67. sw DISP → STATUS until LEAK CHECK? displayed
sw DISP → YES

Follow displayed instructions.

```
*****
* If LEAKAGE HI / SUIT P X.X
*   Go to {2.115 FAILED LEAK CHECK (14.7/10.2 PSIA)},
*   all (SODF: ISS EVA SYS: EMU CONTINGENCY).
*****
```

- ☐☐☐ 68. Go to {1.220 EMU PURGE}, all (SODF: ISS EVA SYS: EVA
PREP/POST).

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EMU ORU

	<u>GND</u>	<u>ISS</u>
2.405 DCM ORU CHANGEOUT.....	373	MPV
2.410 PLSS ORU CHANGEOUT.....	379	MPV
2.415 HUT ORU CHANGEOUT	385	MPV
2.420 SOP ORU CHANGEOUT	391	MPV
2.425 O2 LINE REMOVAL	399	MPV
2.430 O2 ACTUATOR REMOVAL.....	405	MPV
2.435 DCM REMOVAL.....	407	MPV
2.440 HUT/PLSS DISCONNECTION	413	MPV
2.445 HUT/PLSS CONNECTION.....	419	MPV
2.450 DCM INSTALLATION.....	429	MPV
2.455 O2 ACTUATOR INSTALLATION.....	437	MPV
2.460 O2 LINE INSTALLATION	441	MPV

EMU ORU

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2.405 DCM ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 1 of 5 pages

I

(75 Minutes)

OBJECTIVE:

Perform an on-orbit changeout of the Display and Control Module (DCM) on the EMU.

NOTE

1. Location callouts are given from the perspective of a crewmember in the EMU.
2. This is a standalone procedure for removal/installation of the DCM. Assumes the replacement DCM is stowed without HUT attached.

1. VERIFYING AIRLOCK CCAA AND VENTILATION FLOW CONFIGURATION

PCS

Airlock: ECLSS: AL CCAA

AL CCAA

1.1 ✓State – On

1.2 ✓Status – Operational

AL10A1

1.3 ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

AL101_B1 2. Unstow EMU ORU Tool Kit

NOTE

Keep items stowed in EMU ORU Tool Kit when not in use.

Verify the following tools are stowed in the EMU ORU Tool Kit for DCM changeout.

Electrical Tape (Kapton)
HUT to DCM Interface Covers
O2 Line Covers
Electrical Covers J37, P37, J3A, P3A, J4A, and P4A
Hex Head Drivers:
5/32" x 5" Ball Nose Driver 3/8" Drive
3/16" Hex Head 3/8" Drive
7/64" Hex Head 1/4" Drive
Ratchet 3/8" Drive
Driver Handle 1/4" Drive
5-35 in-lbs Trq Driver, 1/4" Drive
5/16" Wrench, open end
4" Ext, 3/8" Drive
30-200 in-lbs Trq Wrench 3/8" Drive
Static Wrist Tether
Teflon Squares
Absorbent Sheets
Powder Free Nitrile Gloves

Inspect tools.

If contamination present, wipe down with absorbent sheets.

2.405 DCM ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 2 of 5 pages

DCM REMOVAL (30 MINUTES)

CAUTION

All personal jewelry should be removed prior to beginning work on any EMU interfaces or sealing surfaces.

- | | |
|------|---|
| DCM | 3. √O2 ACT – OFF
√sw PWR – SCU |
| PSA | 4. √sw SUIT SELECT (two) – OFF
√SUIT SELECT LEDs (four) – Off |
| PLSS | 5. If REBA installed
5.1 √sw REBA (pulltab) – OFF
5.2 EMU Power Harness (P1) ← → REBA (J1) |
| PLSS | 6. If EMU battery installed, remove battery
6.1 Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro. |
| UIA | 6.2 sw PWR EV-1,2 (two) → OFF |
| DCM | 6.3 √sw POWER – SCU |
| | 6.4 Remove Battery and stow. |
| PLSS | 6.5 Engage latch.
6.6 Close thermal cover zipper. |
7. √EMU installed in EDDA (LTA, helmet, lower arms, and gloves removed)
8. SEPARATING TMG INTERFACE
Refer to Figure 1.
8.1 Unzip right and left TMG tunnels.
8.2 Unbutton and roll up TMG from around Temperature Control Valve and Suit P gauge.

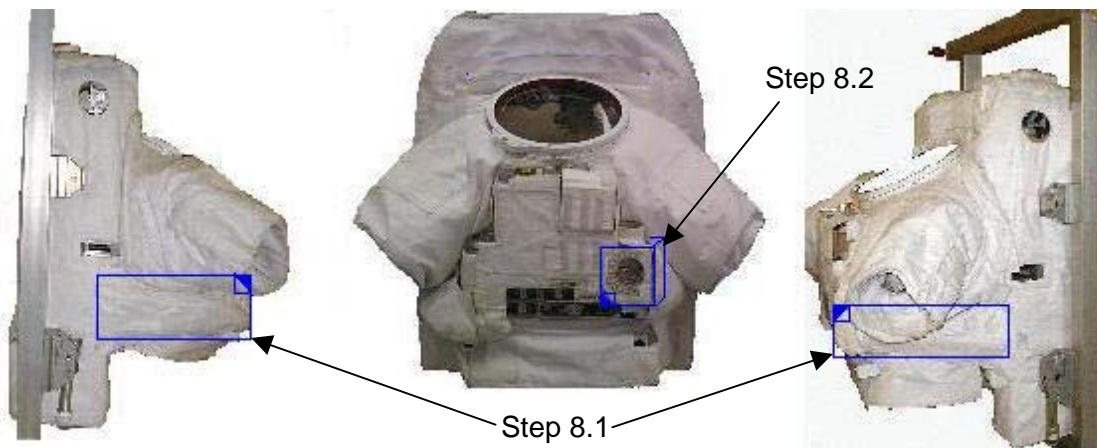


Figure 1.- TMG Interfaces.

2.405 DCM ORU CHANGEOUT

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- DCM 9. Temperature Control Valve captive screws (four) ↺ using 7/64" Hex Head Driver, and 1/4" Driver Handle to remove Temperature Control Valve cover.

Secure Temperature Control Valve cover over Suit P gauge on DCM.
Refer to Figure 2.

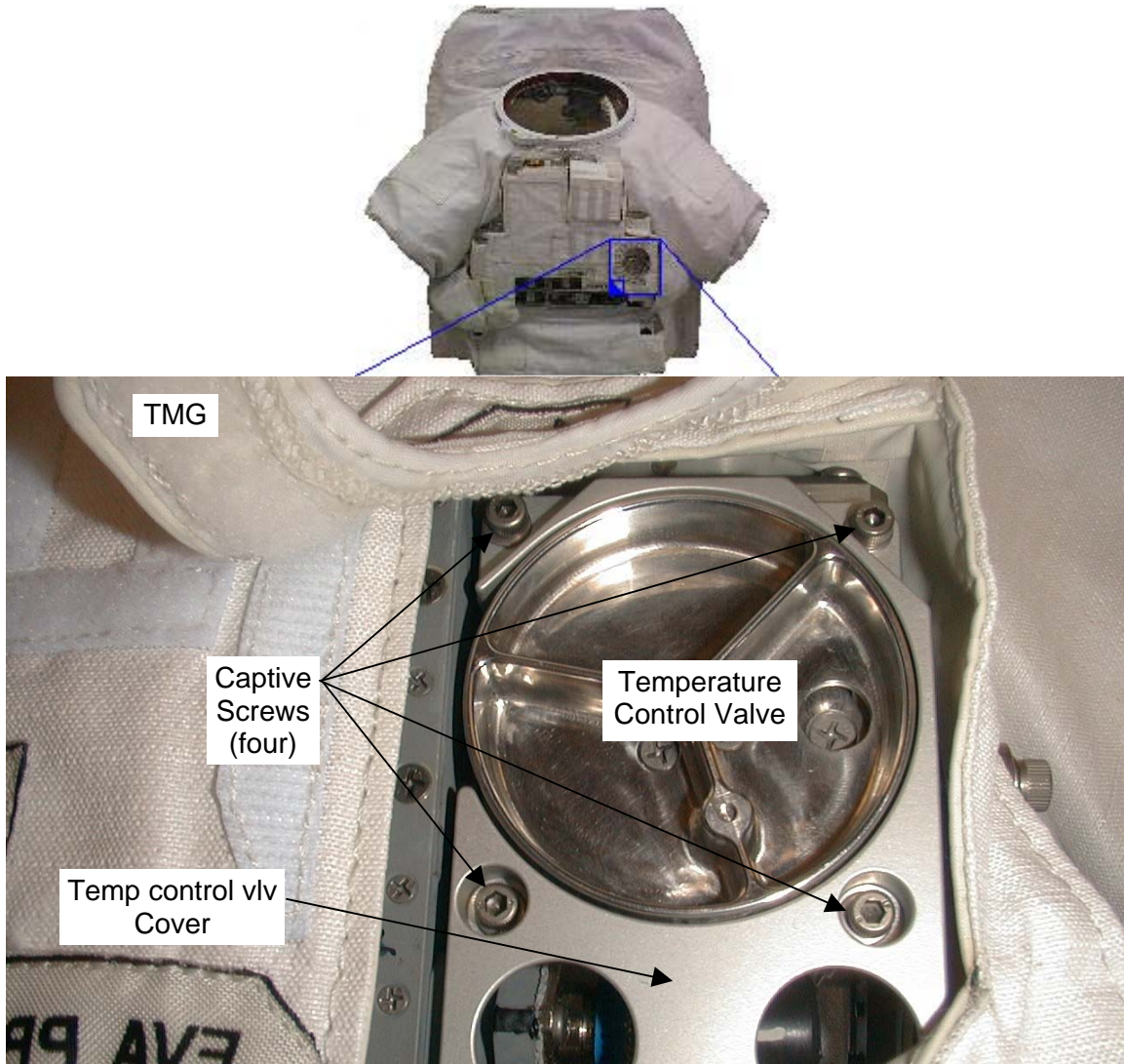


Figure 2.- Temperature Control Valve Cover (TMG Partially Removed).

10. Perform {2.425 O2 LINE REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:
11. Perform {2.430 O2 ACTUATOR REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:
12. Perform {2.435 DCM REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:

2.405 DCM ORU CHANGEOUT

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- DCM 13. Torque Temperature Control Valve captive screws (four) ↻ in cross pattern to 10 in-lbs using 7/64" Hex Head Driver and 5-35 in-lbs Trq Driver.

Unroll and button TMG around Temperature Control Valve and Suit P gauge.
Refer to Figure 2.

NOTE

If long-term stowage of DCM is required, contact **MCC-H** for stowage configuration.

- DCM 14. Record serial number of failed DCM.
Mark and temporarily stow removed DCM.
Log DCM information in IMS.

DCM INSTALLATION (45 MINUTES)

15. Record serial number of replacement DCM.

- DCM 16. Temperature Control Valve captive screws (four) ↻ using 7/64" Hex Head Driver, and 1/4" Driver Handle to remove Temperature Control Valve cover.

Secure Temperature Control Valve cover over Suit P gauge on DCM.
Refer to Figure 2.

17. Perform {2.450 DCM INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:

CAUTION

Avoid overlapping O2 fill line and O2 actuator cable.

18. Perform {2.460 O2 LINE INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:
19. Perform {2.455 O2 ACTUATOR INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:

- DCM 20. Temperature Control Valve captive screws (four) ↻ in cross pattern torque to 10 in-lbs using 7/64" Hex Head Driver and 5-35 in-lbs Torque Driver.

Refer to Figure 2.

21. √HUT, DCM, PLSS hardware connected and restrained

2.405 DCM ORU CHANGEOUT

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22. MATING TMG INTERFACE

Refer to Figure 1, as required.

22.1 Unroll and button TMG around Temperature Control Valve and Suit P gauge.

22.2 Zip right and left TMG tunnels.

22.3 ✓TMG around HUT/PLSS is buttoned/Velcroed

23. ✓TMG interfaces are smooth and free of gaps

24. Stow tools.

Verify the EMU ORU Tool Kit contains all proper tools.

25. A full EMU checkout must be performed prior to EVA and must include the following additions:

- a. After power up, ✓STATUS and record all parameters.
- b. Prior to sw FAN → ON, set Temperature Control Valve: 3 to 7.
- c. At setting sw FAN → ON, start timer.
- d. Verify Fan is ON > 5 minutes before sw Fan → OFF.

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2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 6 pages

I

(60 Minutes)

OBJECTIVE:

Perform an on-orbit replacement of the Primary Life Support Subsystem (PLSS) on the EMU.

NOTE

1. Location callouts are given from the perspective of a crewmember in the EMU.
2. This is a standalone procedure for removal/installation of the PLSS. Assumes the replacement PLSS is stowed without HUT or DCM attached.

PCS

1. VERIFYING AIRLOCK CCAA AND VENTILATION FLOW CONFIGURATION

Airlock: ECLSS: AL CCAA

AL CCAA

1.1 ✓State – On

1.2 ✓Status – Operational

AL10A1

1.3 ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

AL101
_B1

2. Unstow EMU ORU Tool Kit.

NOTE

Keep items stowed in EMU ORU Tool Kit when not in use.

Verify the following tools are stowed in the EMU ORU Tool Kit for PLSS changeout.

Electrical Tape (Kapton)

O2 Line Covers

Electrical Covers J4A, P4A, J3A,P3A, J37, P37, P10B, and J10

Static Wrist Tether

Teflon Squares

Absorbent Sheets

Hex Head Drivers:

1/4" x 5" Ball Nose Driver 3/8" Drive

7/64" Hex Head 1/4" Drive

Ratchet 3/8" Drive

Driver Handle 1/4" Drive

5-35 in-lbs Trq Driver 1/4" Drive

4" Ext, 3/8" Drive

30-200 in-lbs Trq Wrench, 3/8" Drive

Inspect tools.

If contamination present, wipe down with absorbent sheets.

Assemble Foot Restraint, as required.

2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 2 of 6 pages

PLSS REMOVAL (30 MINUTES)

CAUTION

All personal jewelry should be removed prior to beginning work on any EMU interfaces or sealing surfaces.

- | | |
|------|--|
| DCM | 3. √O2 ACT – OFF
√sw PWR – SCU |
| PSA | 4. √sw SUIT SELECT (two) – OFF
√SUIT SELECT LEDs (four) – Off |
| PLSS | 5. If REBA installed
5.1 √sw REBA (pulltab) – OFF
5.2 EMU Power Harness(P1) ← → REBA (J1) |
| DCM | 6. If EMU Battery installed, remove battery.
6.1 √sw POWER – SCU |
| PLSS | 6.2 Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro.
6.3 Remove EMU Battery.
6.4 Engage latch.
6.5 Close thermal cover zipper. |
| | 7. √EMU installed in EDDA (LTA, helmet, lower arms, and gloves removed) |
| | 8. <u>SEPARATING TMG INTERFACE</u>
Refer to Figure 1.
8.1 Unzip right and left TMG tunnels.
8.2 Unbutton and roll up TMG around Temperature Control Valve.
8.3 Unbutton TMG around HUT/PLSS. |

2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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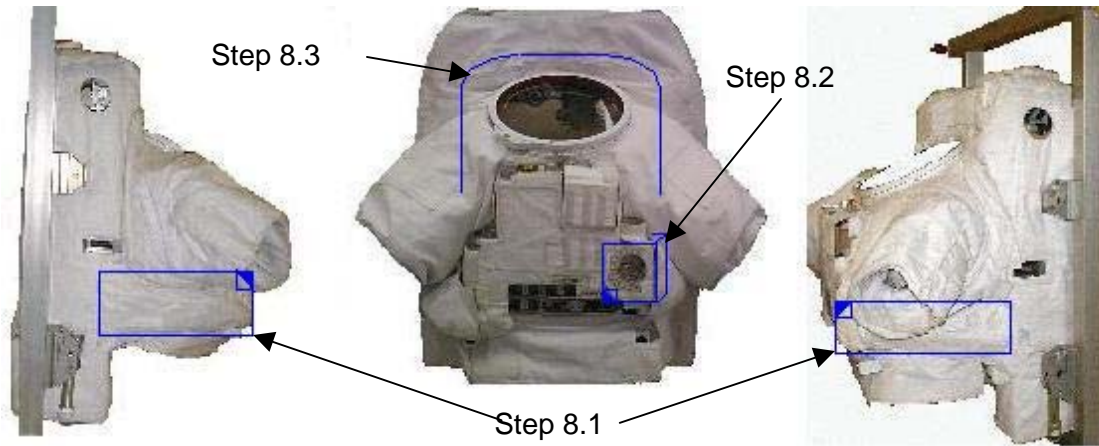


Figure 1.- TMG Interfaces.

9. As required, install PCS Mounting Bracket on rack seat track.

- DCM 10. Temperature Control Valve captive screws (four) ↺ using 7/64" Hex Head Driver, and 1/4" Driver Handle to remove Temperature Control Valve cover.
Secure Temperature Control Valve cover over Suit P gauge on DCM.
Refer to Figure 2.

2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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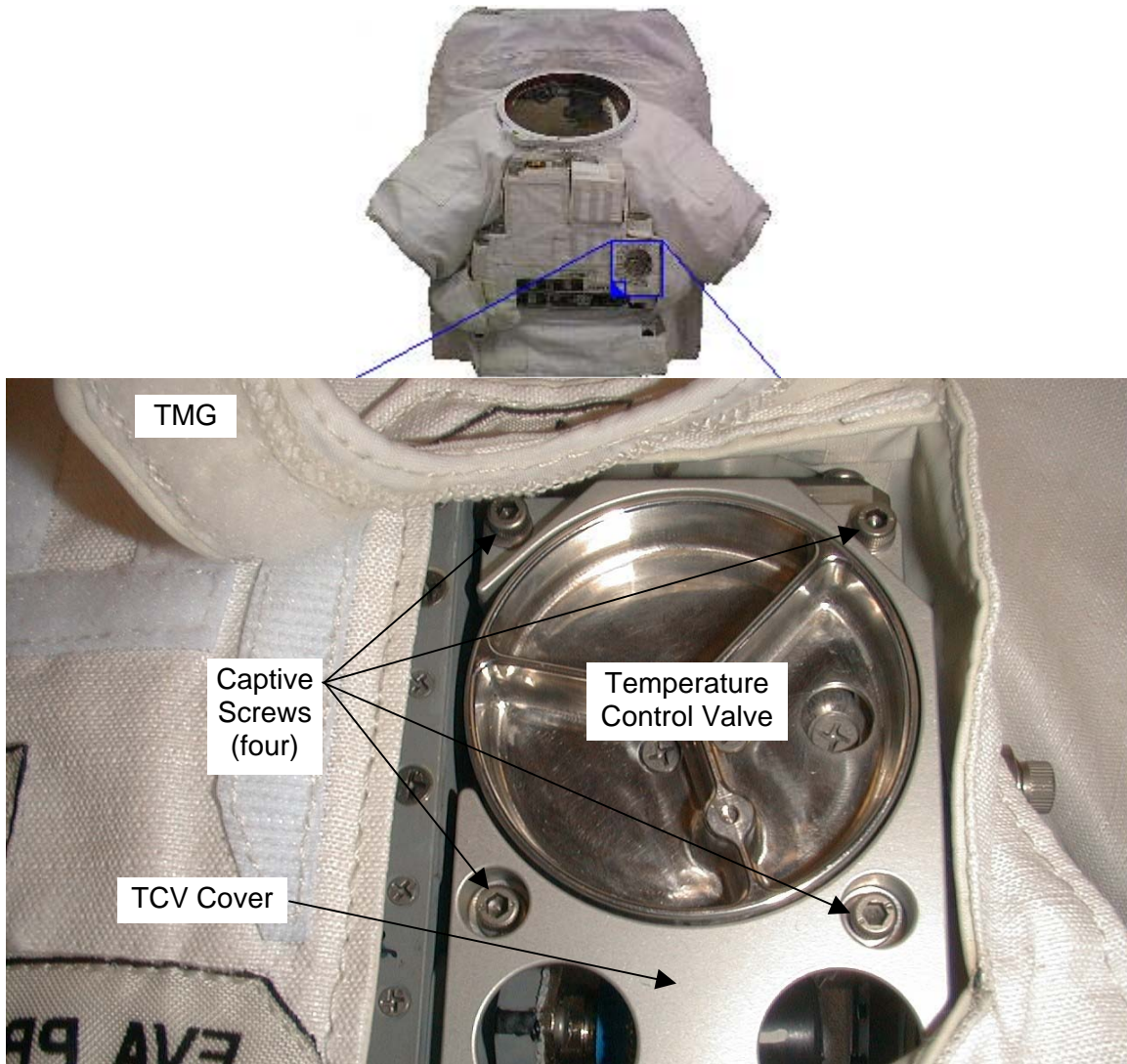


Figure 2.- Temperature Control Valve Cover (TMG Partially Removed).

11. Perform {2.425 O2 LINE REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:
12. Perform {2.430 O2 ACTUATOR REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:
13. Perform {2.440 HUT/PLSS DISCONNECTION}, all (SODF: ISS EVA SYS: EMU ORU), then:

NOTE

Failed PLSS should remain on EDDA to protect hardware until reinstallation of HUT/DCM. If long-term stowage is required, contact **MCC-H** for stowage configuration.

2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 5 of 6 pages

14. Record serial number of failed PLSS.
Mark and temporarily stow failed PLSS.
Log PLSS information in IMS.

PLSS INSTALLATION (30 MINUTES)

15. Record serial number of replacement PLSS.
16. If required, install replacement PLSS in EDDA.
17. Perform {2.445 HUT/PLSS CONNECTION}, all (SODF: ISS EVA SYS: EMU ORU), then:
18. Perform {2.460 O2 LINE INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:
19. Perform {2.455 O2 ACTUATOR INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:
- DCM 20. Temperature Control Valve captive screws (four) ↻ in cross pattern torque to 10 in-lbs using 7/64" Hex Head Driver and 5-35 in-lbs Trq Driver.
Refer to Figure 2.

21. ✓HUT, DCM, PLSS hardware connected and restrained

22. MATING TMG INTERFACE

Refer to Figure 1, as required.

22.1 Button TMG around HUT/PLSS.

22.2 Unroll and button TMG around Temperature Control Valve.

22.3 Zip right and left TMG tunnels.

30. ✓TMG interfaces are smooth and free of gaps

- PLSS 31. If required, install EMU battery.
 - 31.1 Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro.
 - 31.2 Install Battery.

✓Connector alignment
 - 31.3 Engage latch.
 - 31.4 As communication permits, report EMU battery barcodes to **MCC-H**.

2.410 PLSS ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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32. If REBA installed
EMU Power Harness (P1) →|← REBA (J1)
33. Stow tools.
Verify the EMU ORU Tool Kit contains all proper tools.
34. A full EMU checkout must be performed prior to EVA and must include the following additions:
 - a. After power up, √STATUS and record all parameters.
 - b. Prior to sw FAN → ON, set Temperature Control Valve: 3 to 7.
 - c. At setting sw FAN → ON, start timer.
 - d. Verify Fan is ON > 5 minutes before sw Fan → OFF.

2.415 HUT ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 5 pages

I

(140 Minutes)

OBJECTIVE:

Perform an on-orbit changeout of the Hard Upper Torso (HUT) on the EMU.

NOTE

1. Location callouts are given from the perspective of a crewmember in the EMU.
2. This is a standalone procedure for removal/installation of the HUT. Assumes the replacement HUT is stowed without PLSS or DCM attached.

1. VERIFYING AIRLOCK CCAA AND VENTILATION FLOW CONFIGURATION

PCS

Airlock: ECLSS: AL CCAA

AL CCAA

1.1 ✓State – On

1.2 ✓Status – Operational

AL10A1

1.3 ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

AL1011

2. Unstow EMU ORU Tool Kit

_B

NOTE

Keep items stowed in EMU ORU Tool Kit when not in use.

Verify the following tools are stowed in the EMU ORU Tool Kit for HUT changeout.

Electrical Tape, Kapton

Interface Covers, HUT to PLSS and HUT to DCM

Electrical Covers J4A, P4A, J3A, P4A, P10B, and J10

Static Wrist Tether

Teflon Squares

Absorbent Sheets

Connector Gripper Band

Hex Head Drivers:

1/4" x 5" Ball Nose Driver 3/8" Drive

5/32" x 5" Ball Nose Driver 3/8" Drive

3/16" Hex Head 3/8" Drive

Ratchet 3/8" Drive

5/16" Wrench open end

4" Ext. 3/8" Drive

30-200 In-lbs Trq Wrench 3/8" Drive

Scissors

2.415 HUT ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 2 of 5 pages

Inspect tools.

If contamination present, wipe down with absorbent sheets.

Assemble Foot Restraint and PCS Mounting Bracket, as required.

HUT REMOVAL (60 MINUTES)

CAUTION

All personal jewelry should be removed prior to beginning work on any EMU interfaces or sealing surfaces.

DCM 3. √O2 ACT – OFF
√sw PWR – SCU

PLSS 4. If REBA installed, remove REBA
4.1 √sw REBA (pulltab) → OFF
4.2 EMU Power Harness (P1) ←|→ REBA (J1)
4.3 Remove REBA from EMU.
4.4 Install REBA J1 fabric cover.
4.5 Tuck P1 in sleeve.

PLSS 5. If EMU Battery installed, remove battery.
5.1 Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro.
5.2 Remove EMU Battery.
5.3 Engage latch.
5.4 Zip thermal cover.

6. √EMU installed in EDDA and EDDA latch closed (LTA, helmet, lower arms, and gloves removed)

7. TMG INTERFACE SEPARATION

Refer to Figure 1.

7.1 Unzip right and left TMG tunnels.

7.2 Unbutton and remove TMG from around suit pressure gauge.

7.3 Unbutton TMG around HUT/PLSS.

2.415 HUT ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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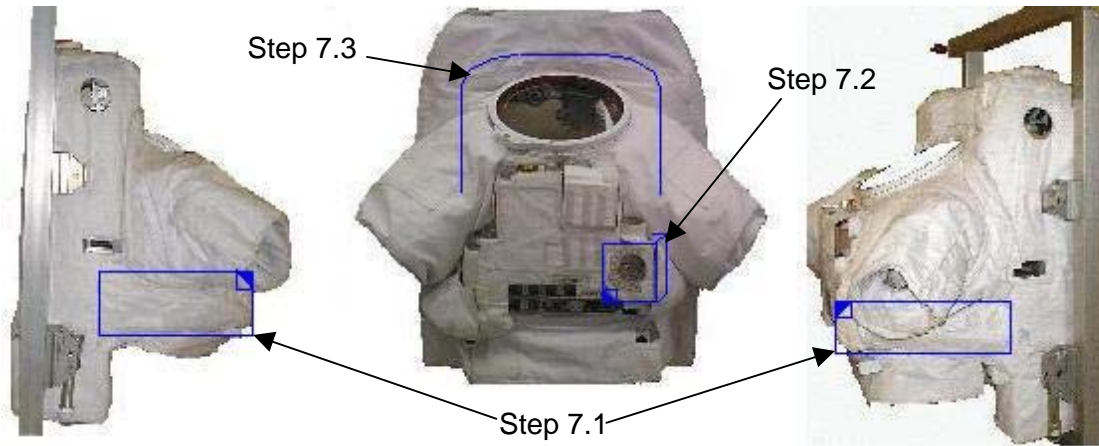


Figure 1.- TMG Interfaces.

8. Install PCS Mounting Bracket on rack seat track and position to prepare for DCM restraint.
Refer to Figure 4 of {2.435 DCM REMOVAL} (SODF: ISS EVA SYS: EMU ORU), then:
9. Perform {2.435 DCM REMOVAL}, all (SODF: ISS EVA SYS: EMU ORU), then:

CAUTION

Avoid overstressing or kinking O2 fill line and O2 actuator lines. The bend radii should be no less than the following:
O2 fill line - 3-inch bend radius
O2 actuator cable - 2-inch bend radius

10. Perform {2.440 HUT/PLSS DISCONNECTION}, all (SODF: ISS EVA SYS: EMU ORU), then:

NOTE

If long-term stowage of HUT is required, contact **MCC-H** for stowage configuration.

11. Record barcode of removed HUT.
Mark and temporarily stow HUT.
Log information in IMS.

HUT INSTALLATION (60 MINUTES)

12. Record serial number of replacement HUT.

HUT 13. ✓Right and left TMG tunnels unzipped

14. Perform {2.445 HUT/PLSS CONNECTION}, all (SODF: ISS EVA SYS: EMU ORU), then:

2.415 HUT ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 4 of 5 pages

15. Perform {2.450 DCM INSTALLATION}, all (SODF: ISS EVA SYS: EMU ORU), then:

16. √HUT, DCM, PLSS hardware connected and restrained

17. TMG INTERFACE MATING

Refer to Figure 1, as required.

17.1 Button TMG around HUT/PLSS.

17.2 Secure HUT TMG over suit pressure gauge and button TMG around Temperature Control Valve.

17.3 Zip right and left TMG tunnels.

18. √TMG interfaces are smooth and free of gaps

PLSS

19. If required, install EMU battery.

19.1 Unzip thermal cover.

Affix thermal cover to top of EMU with Velcro.

19.2 Install Battery.

√Connector alignment

19.3 Engage latch.

19.4 As communication permits, report EMU battery barcodes to **MCC-H**.

19.5 Close thermal cover zipper.

PLSS

20. If required, install REBA.

20.1 Unzip TMG to access REBA pouch and EMU Power Harness.

20.2 Remove REBA J1 fabric cover.

20.3 Install REBA on EMU.

20.4 Configure REBA pull tabs through slots in TMG.

20.5 √sw (pulltab) REBA → OFF, toward left arm of suit

20.6 EMU Power Harness (P1) →|← REBA (J1)

20.7 Report REBA barcode (serial number) to **MCC-H** as comm permits.

20.8 Zip TMG closed.

21. Stow tools.

Verify the EMU ORU Tool Kit contains all proper tools.

2.415 HUT ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 5 of 5 pages

22. A full EMU checkout must be performed prior to EVA and must include the following additions:
 - a. After power up, √STATUS and record all parameters.
 - b. Prior to sw FAN → ON, set Temperature Control Valve: 3 to 7.
 - c. At setting sw FAN → ON, start timer.
 - d. Verify Fan is ON > 5 minutes before sw Fan → OFF.

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2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 8 pages

I

(40 Minutes)

OBJECTIVE:

Perform an on-orbit changeout of the Secondary Oxygen Pack (SOP) on the EMU.

NOTE

1. Location callouts are given from the perspective of a crewmember in the EMU.
2. This is a standalone procedure for the removal/installation of the SOP. Assumes the replacement SOP is stowed without the PLSS.

1. VERIFYING AIRLOCK CCAA AND VENTILATION FLOW CONFIGURATION

PCS

Airlock: ECLSS: AL CCAA

AL CCAA

1.1 ✓State – On

1.2 ✓Status – Operational

AL10A1

1.3 ✓Flexible Ventilation Duct attached to Conditioned Air Supply connection

AL101
_B1

2. Unstow EMU ORU Tool Kit.

NOTE

Keep items stowed in EMU ORU Tool Kit when not in use.

Verify the following tools are stowed in the EMU ORU Tool Kit for SOP changeout.

Electrical Tape, Kapton
SOP Manual Override Protection Tool
SOP Tool, 3/6" x 6" Hex Head Driver, 3/8" Drive
Ratchet 3/8" Drive
5-35 in-lbs Trq Driver, 1/4" Drive
1/4" to 3/8" Adaptor
Scissors
Powder Free Nitrile Gloves
Absorbent Sheets
Static Wrist Tether

Inspect tools.

If contamination present, wipe down with absorbent sheets, assemble Foot Restraint, as required.

SOP REMOVAL (20 MINUTES)

CAUTION

All personal jewelry should be removed prior to beginning work on any EMU interfaces or sealing surfaces.

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 2 of 8 pages

- DCM 3. √O2 ACT – OFF
√sw POWER – SCU
√SCU disconnected
- PLSS 4. If REBA Installed, remove REBA
4.1 √sw REBA (pulltab) – OFF, toward left arm of suit
4.2 EMU Power Harness (P1) ←|→ REBA (J1)
4.3 Remove REBA from EMU.
4.4 Install REBA J1 fabric cover.
4.5 Temporarily stow REBA.
- DCM 5. If EMU Battery installed, remove battery
5.1 √sw POWER – SCU
- PLSS 5.2 Unzip thermal cover.
Affix thermal cover to top of EMU with Velcro.
5.3 Remove EMU Battery, temporarily stow.
5.4 Engage latch.
5.5 Close thermal cover, do not zip.
6. Waist Ring ←|→ HUT
Temporarily stow LTA.

CAUTION

Avoid holding the PLSS near the valve module area (top) or near the regulators (bottom) that are exposed when the SOP is removed. Handle the PLSS by the water tank structure.

7. Remove EMU from EDDA.
8. Remove TMG from PLSS/SOP interfaces.

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

9. Don static wrist tether.

Static wrist tether→|← lower EMU PLSS battery attach post

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 3 of 8 pages

10. SOP Pressure Transducer (P32) ←|→ PLSS

Cover mating halves with Kapton tape
Refer to Figure 1.

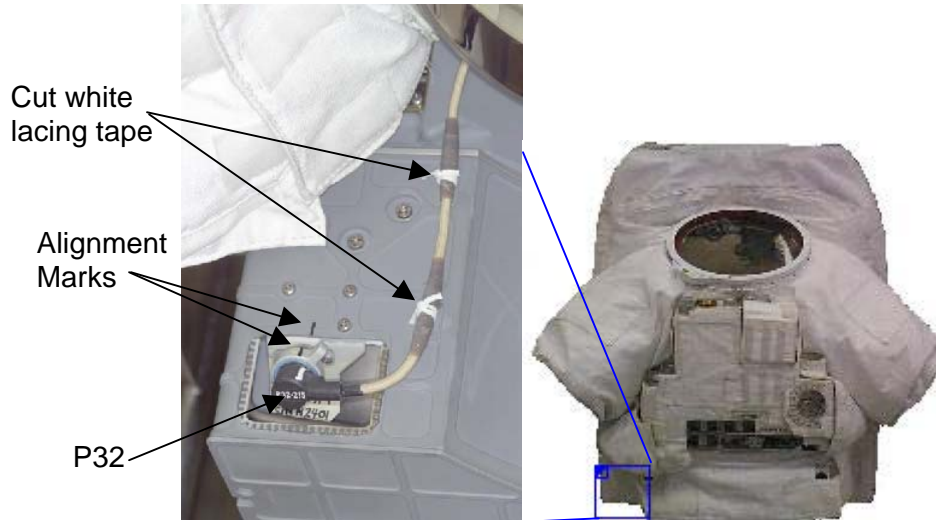


Figure1.- SOP Pressure Transducer (P32) and Cable Tie Downs.

- SOP
11. Cut lacing tape at cable tie down points (two).
Refer to Figure 1.
 12. Velcro SOP pressure transducer out of the way.
 13. Doff static wrist tether.
 14. Don Nitrile gloves.
 15. SOP attachment screws (seven) ↺ using SOP Tool and 3/8" Drive Ratchet.
Refer to Figure 2.



Figure 2.- SOP Captive Screws.

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 4 of 8 pages

CAUTION

Take care not to lose or damage PLSS vent tube O-Ring during this procedure. Avoid touching the SOP bottles and internal components. Refer to Figures 4 and 5.

- SOP 16. Grasp ends of SOP housing and pull straight off PLSS.

NOTE

If the SOP is removed for > 10 minutes, the interfaces will need to be covered to prevent contamination.

17. Install protection tool under SOP manual override.
Refer to Figure 3.

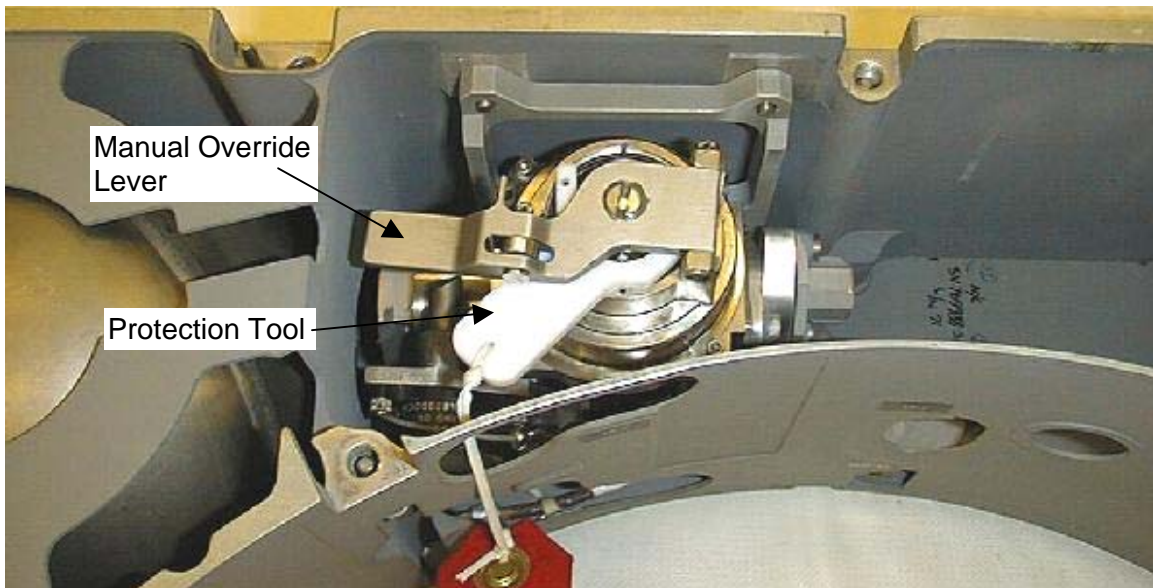


Figure 3.- Installation of Manual Override Protection Tool.

18. Cover PLSS vent tube opening with Telfon square; secure with Kapton tape.
Refer to Figure 4.
Cover SOP O2 line opening with Teflon square; secure with Kapton tape.
Refer to Figure 5.

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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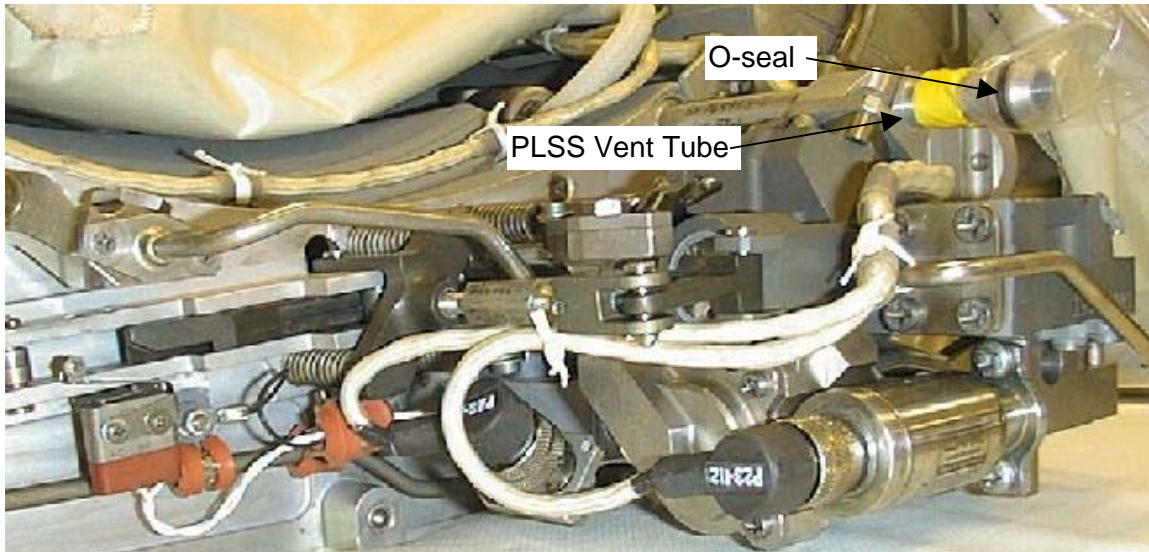


Figure 4.- Protective Covering - PLSS Vent Tube.

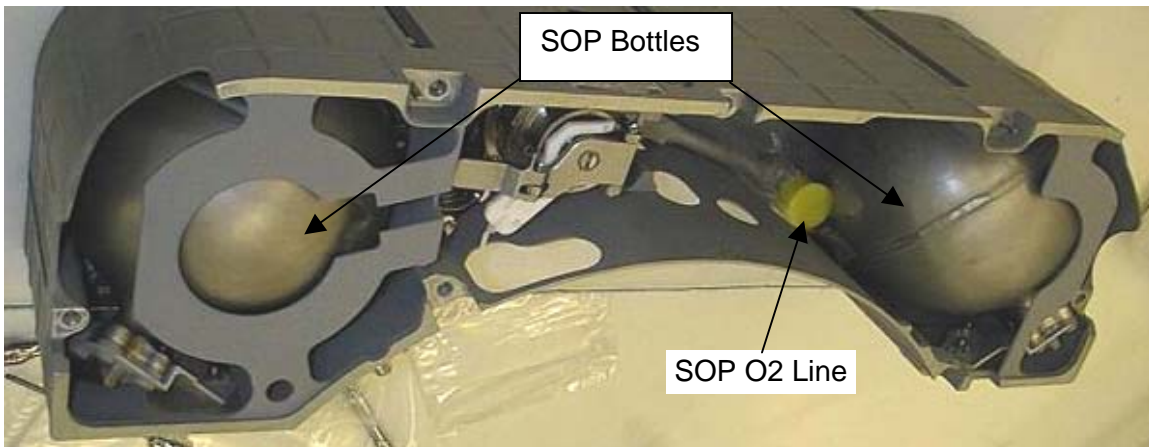


Figure 5.- Protective Covering - SOP O2 Line.

19. Record serial number of SOP.
Mark and temporarily stow SOP.
Log new stowage location for SOP in IMS.

SOP INSTALLATION (20 MINUTES)

20. Unstow replacement SOP.

- | | |
|------|---|
| PLSS | 21. ✓ PLSS TMG removed from the SOP interfaces |
| | 22. Inspect PLSS/SOP mounting holes for debris, damage. |
| SOP | 23. Inspect SOP for contamination, damage. |
| PLSS | 24. Remove protective covering from PLSS vent tube.
Inspect PLSS vent tube for debris, damage. |

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 6 of 8 pages

25. Inspect SOP Interface O-Seal on PLSS vent tube for damage.
Replace SOP Interface O-Seal as required P/N STSV047N015.
Refer to Figure 4.
- SOP 26. Remove protective covering from SOP O2 line.
Inspect SOP O2 line for debris, damage.
Refer to Figure 5.

CAUTION

Take care to avoid damaging or rubbing the vent tubing during the following operations. Avoid touching SOP bottles, O2 actuator cabling and internal components. Refer to Figures 4 and 5.

27. Grasp ends of SOP housing, align SOP fitting with PLSS vent tube.
28. Install SOP on PLSS.
- PLSS 29. Engage the first few threads of captive screws (seven).
Lightly tighten screws using SOP Tool.
Refer to Figure 2.
30. Torque captive screws (seven) ↻ to 28 in-lbs using SOP Tool, 5-35 in-lbs Trq Driver and 1/4" to 3/8" Adaptor
31. Remove protection tool from manual override.

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

32. Don static wrist tether.
- Static wrist tether →|← lower EMU PLSS battery attach post
33. SOP Pressure Transducer (P32) →|← SOP
- Refer to Figure 1.
34. Doff static wrist tether.
35. Stow tools.
Verify the EMU ORU Tool Kit contains all proper tools.
36. Reinstall TMG on PLSS and SOP interfaces.
37. Perform {1.520 EMU POWERUP/POWERDOWN}, Powering Up EMUs (SODF: ISS EVA SYS: EMU MAINTENANCE), then:

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2)

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38. Helmet ←|→ HUT

Temporarily stow Helmet.

39. Unstow SCOF from EMU Equipment Bag.
Install SCOF and lock.

DCM 40. √STATUS: SOP P: 5410 to 6800

EMU	1	2	3
40. SOP P			

41. √SOP gauge 5400 to 6800

Note SOP interstage gauge.

EMU	1	2	3
41. SOP GAUGE			
INT GAUGE			

PCS 42. Airlock: ECLSS

AL ECLSS

'Equipment Lock'

√Cab Temp

AIRLOCK	
42. Cab Temp	

DCM 43. Cycle sw STATUS to display SUIT P.

NOTE

Minimize the duration of depressing the manual override to conserve SOP pressure.

44. While depressing SOP manual override (30 seconds maximum)

√SOP interstage gauge < 600

DCM

√STATUS: SUIT P: 3.4 to 3.9 and stable

EMU	1	2	3
44. INT GAUGE			
SUIT P			

2.420 SOP ORU CHANGEOUT

(ISS EVA SYS/7A - ALL/FIN 2) Page 8 of 8 pages

45. ✓STATUS: SOP P: 5410 to 6800

EMU	1	2	3
45. SOP P			

46. ✓STATUS: record all parameters; report to **MCC-H**, as time permits

47. O2 ACT → PRESS

48. While moving O2 ACT → EVA

SOP Visually verify SOP manual override is moved downward by O2 actuator mechanism.

DCM 49. ✓O2 ACT – EVA

50. ✓STATUS: O2 ACT – EVA

✓STATUS: SUIT P: 4.2 to 4.4

51. O2 ACT → OFF

52. Remove SCOF.
Stow SCOF in EMU Equipment Bag.

53. Helmet→|←HUT

54. As required, perform {1.520 EMU POWERUP/POWERDOWN},
Powering Down EMUs (SODF: ISS EVA SYS: EMU MAINTENANCE),
then:

55. Perform steps 20 to 36 on alternate EMU, if required to protect exposed
PLSS hardware.

2.425 O2 LINE REMOVAL

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 6 pages

I

(20 minutes)

OBJECTIVE:

To perform an on-orbit removal of the oxygen line from the Display and Control Module (DCM).

UIA 1. √OSCA – O2 CLOSED (O2 3AKP)

2. SCU →|← DCM

PCS 3. √Airlock O2 HI pressure supply valve – Closed

Airlock: ECLSS: O2 Hi Pressure Supply Valve

AL O2 Hi Pressure Supply Valve

Verify Actual Position – Closed

NOTE

Removal of ОРЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotated clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward. Refer to Figure 1.



Figure 1.- OSCA and ОРЛАН Caps.

UIA 4. ОРЛАН-I (II) cap 2 ←|→ OSCA
ОРЛАН-I (II) cap 3 ←|→ OSCA
OSCA ↻ PRESS (НАДДУВ)

2.425 O2 LINE REMOVAL

(ISS EVA SYS/7A - ALL/FIN 2)

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5. OXYGEN EMU 1,2 vlv (two) → OPEN

NOTE

Step 6 will depressurize any O2 in the UIA O2 supply lines via the OSCA prior to O2 fill line removal.

6. OXYGEN ORLAN vlv → OPEN

7. When purge no longer audible

√EMU O2 SUPPLY PRESS gauge \cong 0

√ORLAN O2 SUPPLY PRESS gauge \cong 0

8. OSCA ↻ O2 CLOSED (O2 3AKP)

ОРЛАН-I (II) cap 2 → | ← OSCA

ОРЛАН-I (II) cap 3 → | ← OSCA

9. OXYGEN EMU 1,2 vlv (two) → CLOSE

10. OXYGEN ORLAN vlv → CLOSE

11. SCU ←|→ DCM

12. Position Flexible Vent Duct so that air flow is over O2 fill line interface.

√Temp control vlv cover, TMG, and EMU left arm are not blocking flow

√Air flow is toward the CCAA HEPA filter inlet

Continue airflow over demated interface until interface is sealed.

Refer to Figure 2.

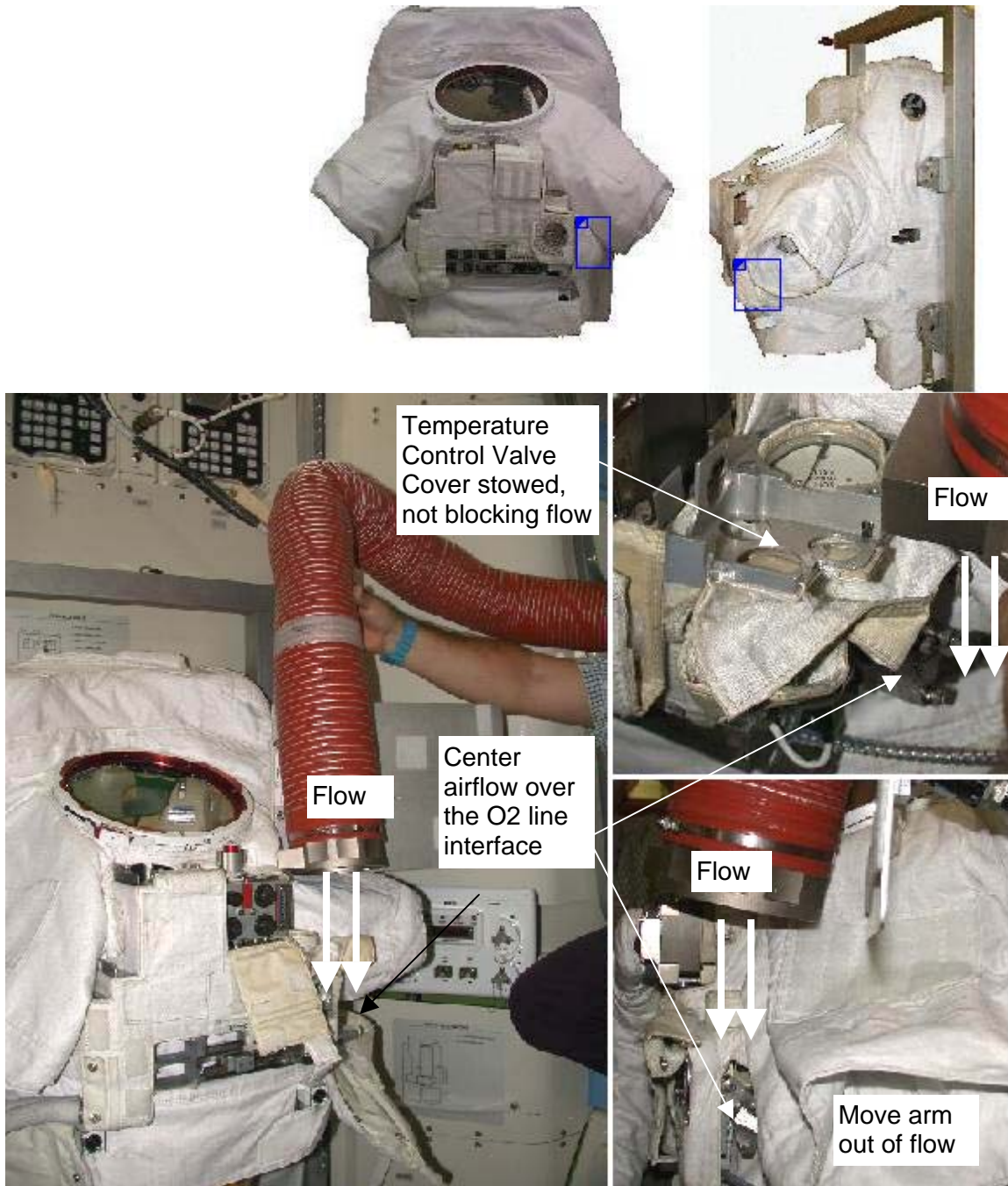


Figure 2.- Flexible Vent Duct Positioning for O2 Fill Line Interface.

2.425 O2 LINE REMOVAL

(ISS EVA SYS/7A - ALL/FIN 2)

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13. Don powder-free Nitrile gloves.

WARNING

Maintain alignment of O2 line during removal to avoid damage to the bore. Be careful not to contact O2 wetted surface. Refer to Figure 3.

CAUTION

Avoid overstressing or kinking O2 fill line and O2 actuator lines. The bend radii should be no less than the following:
O2 fill line - 3-inch bend radius
O2 actuator cable - 2-inch bend radius

14. Retrieve O2 line covers and prepare for sealing O2 fill line interface.
15. Captive screws (three) ↺ using 5/32" x 5" Ball Nose Driver and 3/8" Drive Ratchet.
Refer to Figure 3.
If any contamination present, contact **MCC**.

2.425 O2 LINE REMOVAL

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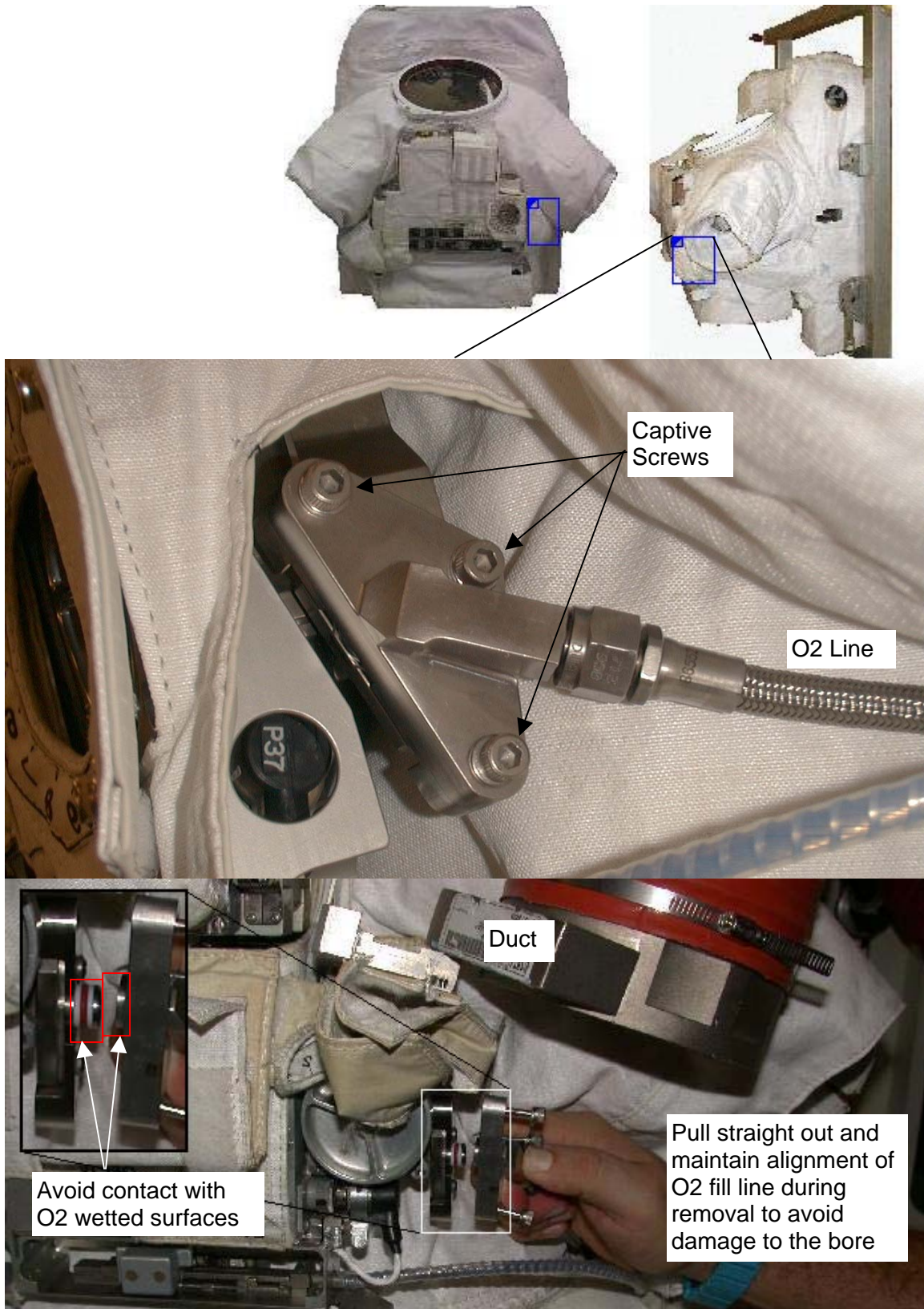


Figure 3.- O2 Fill Line Interface.

2.425 O2 LINE REMOVAL

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16. Remove O2 fill line from DCM mounting plate.
17. Seal the open end of the O2 line with O2 line cover.
Seal open filter on DCM mounting plate with O2 line cover.
Secure O2 line to PLSS using strap in TMG.
Refer to Figure 4.

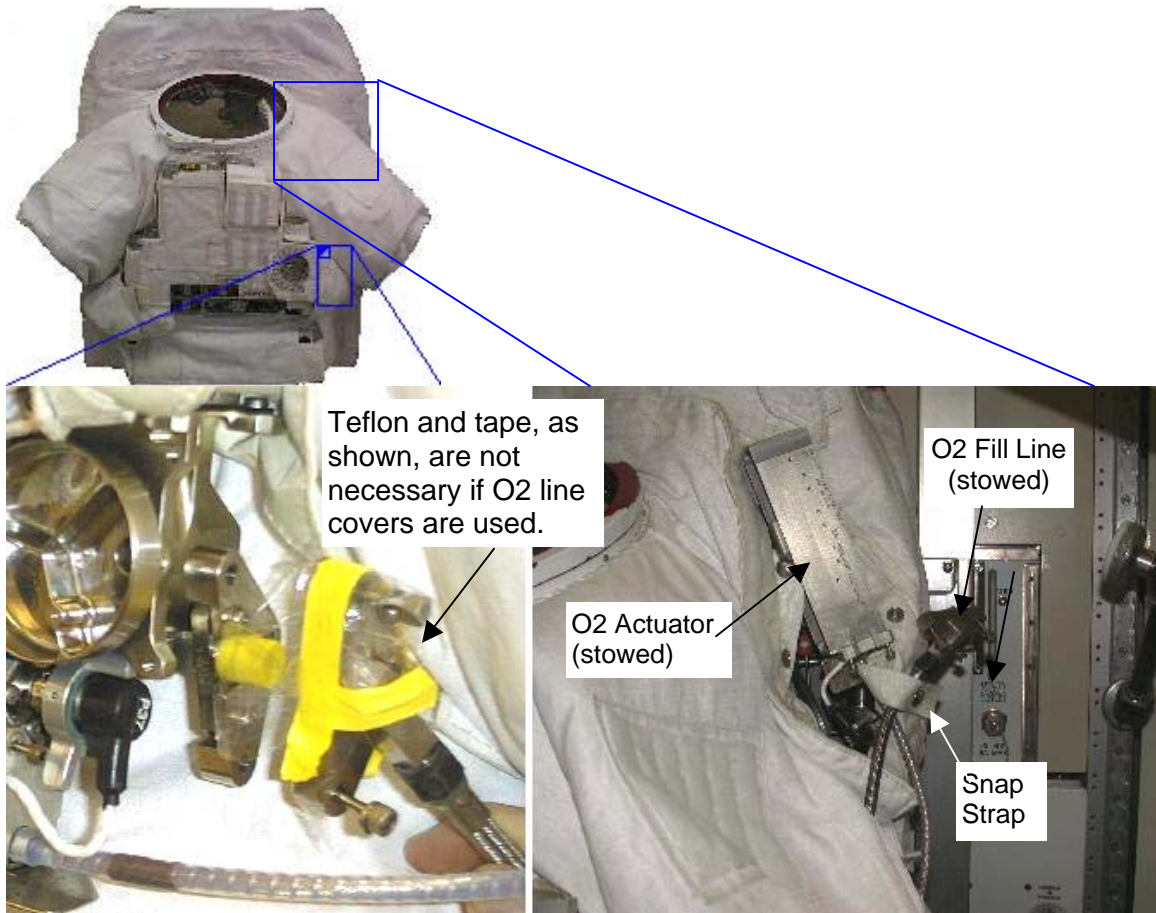


Figure 4.- Sealing and Stowing O2 Fill Line.

2.430 O2 ACTUATOR REMOVAL

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 2 pages

(10 minutes)

OBJECTIVE:

To perform an on-orbit removal of the O2 Actuator from the Display and Control Module (DCM).

DCM 1. ✓TCV cover removed

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

2. Don static wrist tether.
Static wrist tether→|← lower EMU PLSS battery attach post

DCM 3. P-37 ←|→ J-37 by pushing the rotary assist tab ↺
Refer to Figure 1.

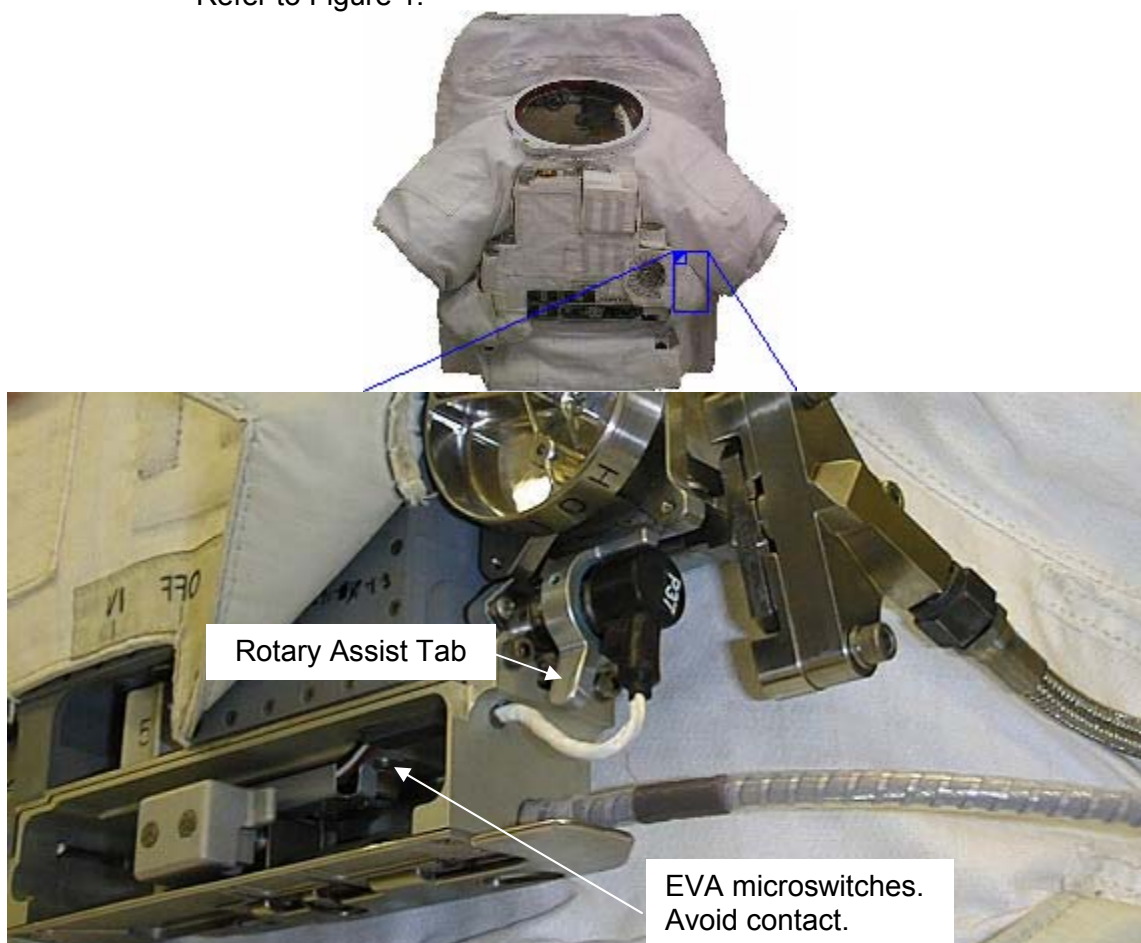


Figure 1.- O2 Actuator and P-37 Connector.

2.430 O2 ACTUATOR REMOVAL

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4. Electrical Covers →|← P37 and J37
5. Doff static wrist tether.

CAUTION

Avoid contact with the microswitches within the microswitch assembly of the O2 actuator. Refer to Figure 1.

CAUTION

Avoid overstressing or kinking O2 fill line and O2 actuator lines. The bend radii should be no less than the following:

- O2 fill line - 3-inch bend radius
- O2 actuator cable - 2-inch bend radius

6. Captive screws (two) ↺ using 7/64" Hex Head Driver and 1/4" Driver Handle to demate O2 actuator from DCM as shown in Figure 2.

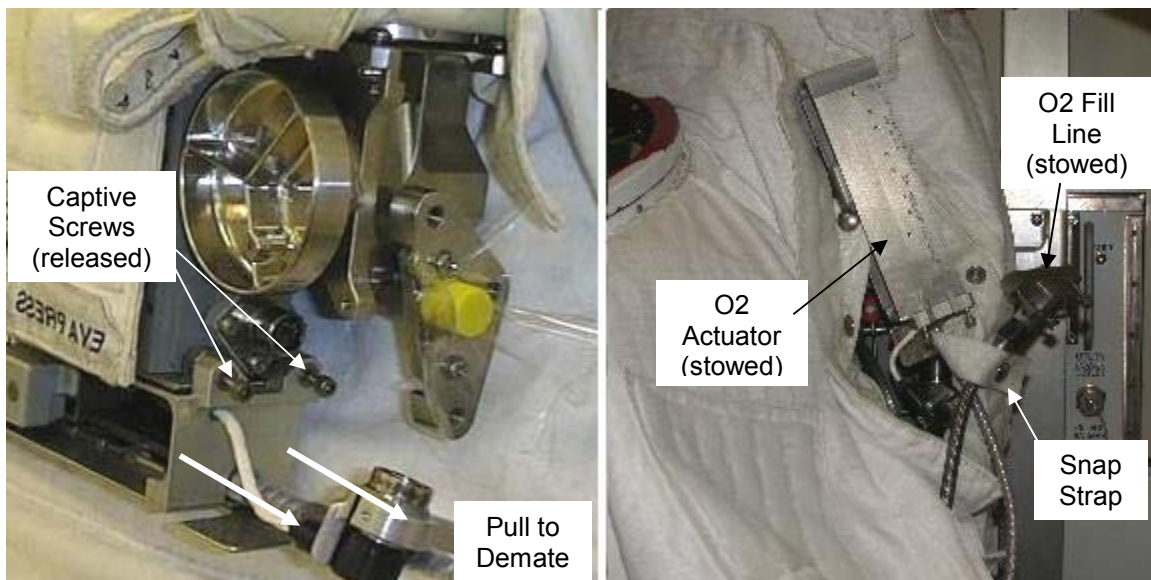


Figure 2.- O2 Actuator Removal and Stowage.

- PLSS
7. Restrain O2 actuator using snap strap on left PLSS TMG as shown in Figure 2.

2.435 DCM REMOVAL

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I

(30 minutes)

OBJECTIVE:

To perform an on-orbit removal of the Display and Control Module (DCM) from the Hard Upper Torso (HUT).

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

1. Don static wrist tether.

√Static wrist tether →|← lower EMU PLSS battery attach post

NOTE

Do not demate the electrical connectors at the DCM.

- PLSS
2. Color-coded electrical connectors (two) ←|→ PLSS connector bracket
Refer to Figure 1.

ORU Kit

If reinstalling DCM onto another HUT/PLSS

3. Cover electrical connectors/receptacles with Kapton tape.

If DCM to be stowed standalone

4. Cover electrical connectors/receptacles with J4A (PLSS) and P4A (DCM), J3A (PLSS) and P3A (DCM) covers.

2.435 DCM REMOVAL

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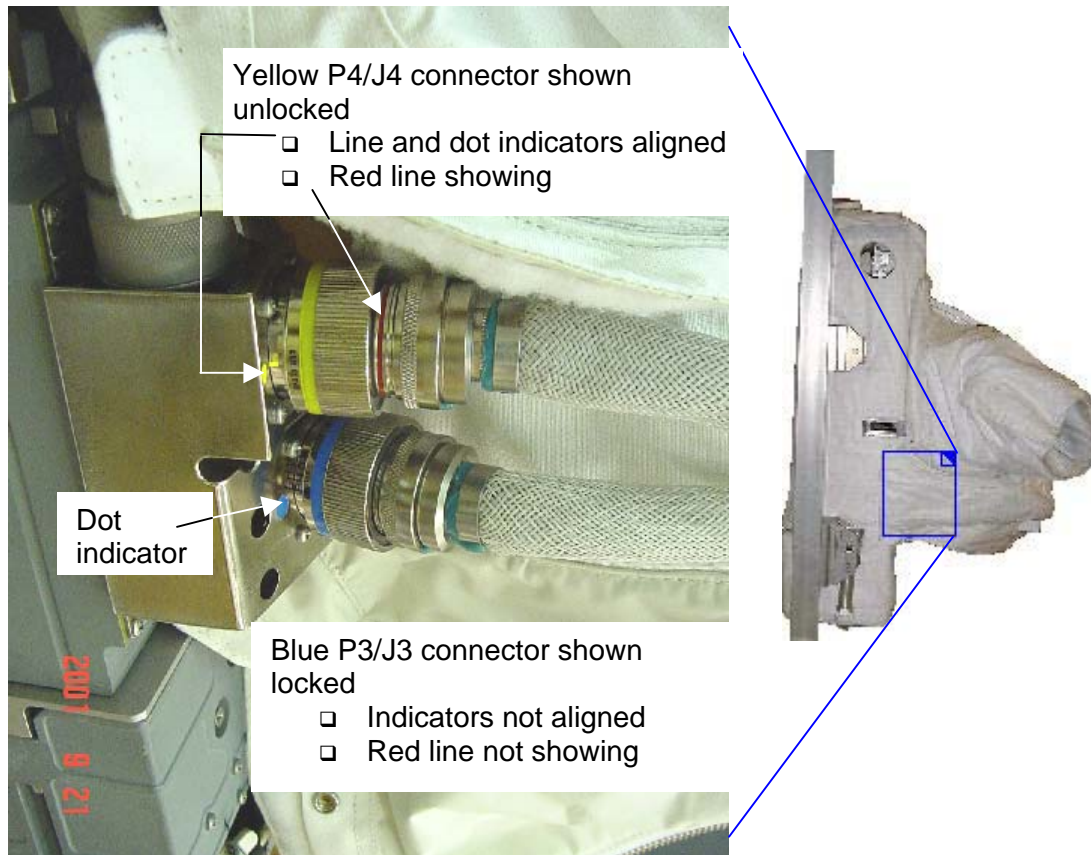


Figure 1.- PLSS Color-Coded Electrical Connector Bracket.

5. Doff static wrist tether, leave clip attached to post.

DCM 6. sw COMM mode → PRI

NOTE

Captive screws can become uncaptive if removed further than required (~ 3/4 inch).

7. Captive screws (two) ↺ until loose from the upper and lower DCM shim mounts using 5/32" x 5" Ball Nose Driver with 3/8" Drive Ratchet. Refer to Figure 2.

2.435 DCM REMOVAL

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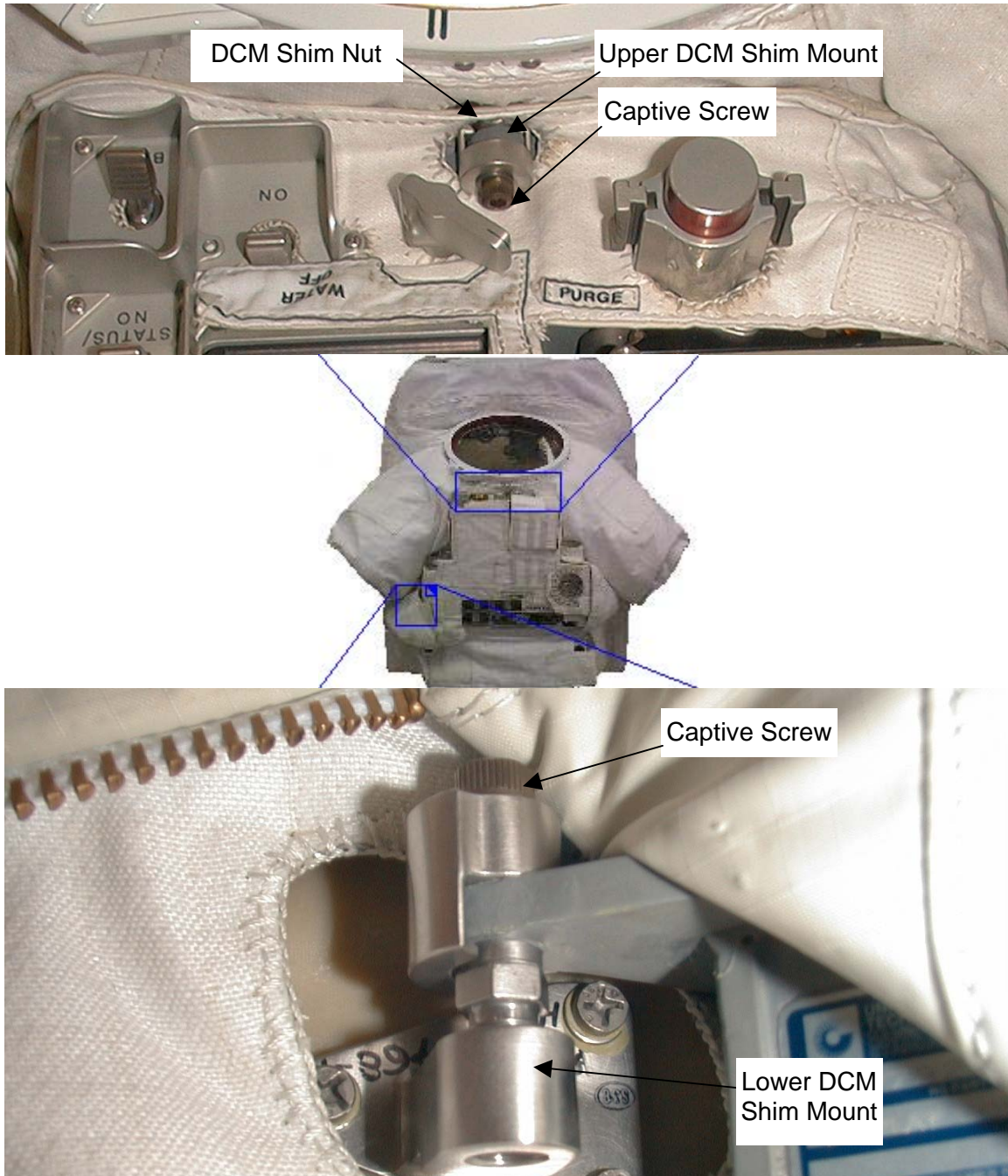


Figure 2.- Upper and Lower DCM Shim Mounts.

- HUT
8. Remove front tube shield from inside HUT by demating Velcro.
 9. Disengage slide-locks (two) on DCM captive screws. Refer to Figure 3.

2.435 DCM REMOVAL

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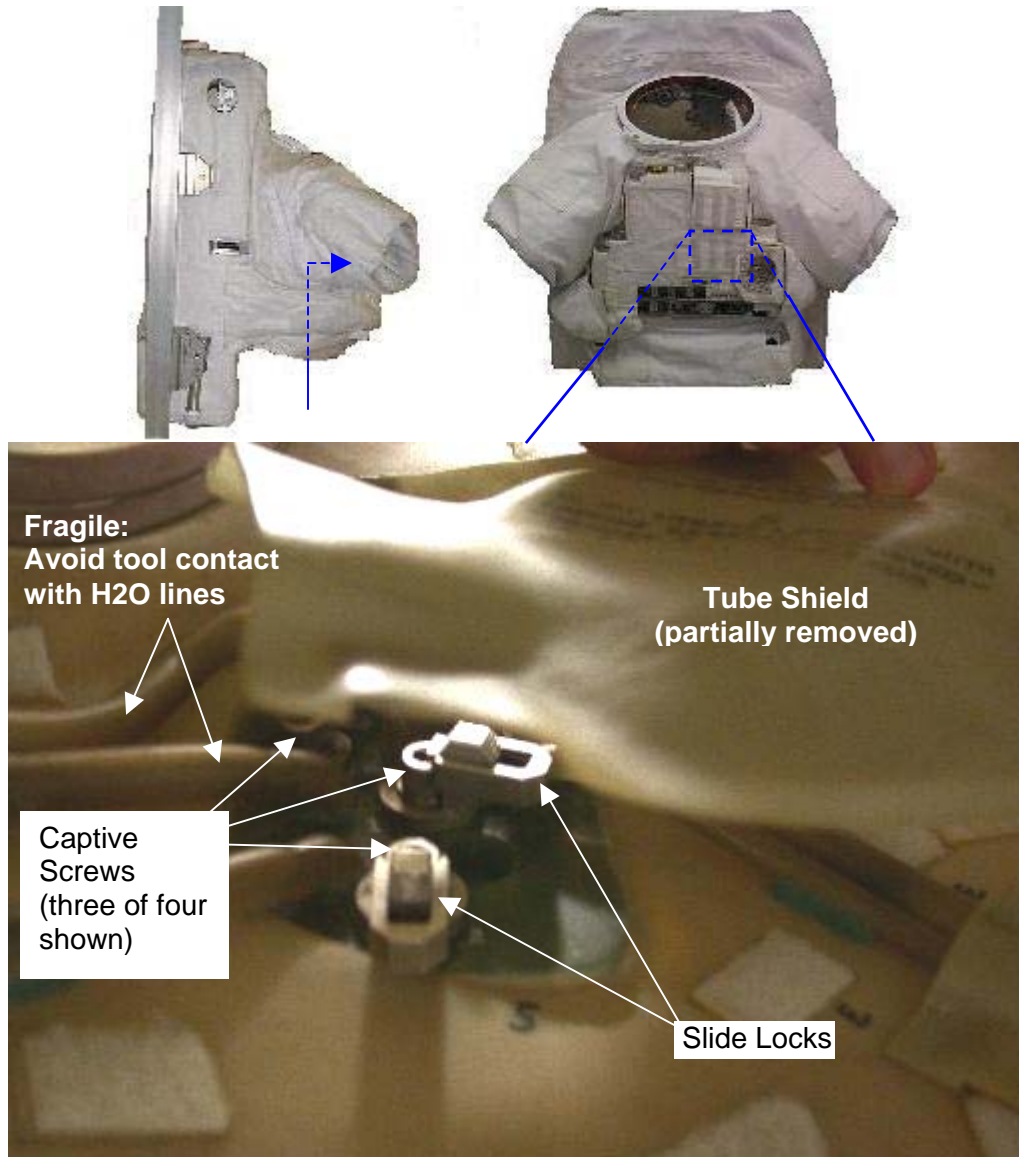


Figure 3.- DCM-to-HUT Interface (inside, front of HUT)

10. Captive screws (four) ↺ using 3/16" Hex Head Driver and Ratchet 3/8" Drive.
11. ✓Screws completely backed out

CAUTION

Avoid overstressing or kinking O2 fill line and O2 actuator lines.
The bend radii should be no less than the following:
O2 fill line - 3-inch bend radius
O2 actuator cable - 2-inch bend radius

- DCM
12. Carefully separate DCM from HUT.
 13. Inspect HUT/DCM interfaces for water.
If water present, dry with absorbent sheets (from ORU Tool Kit) by blotting.

2.435 DCM REMOVAL

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14. Carefully rotate and restrain DCM on PCS Mounting Bracket. Refer to Figure 4.

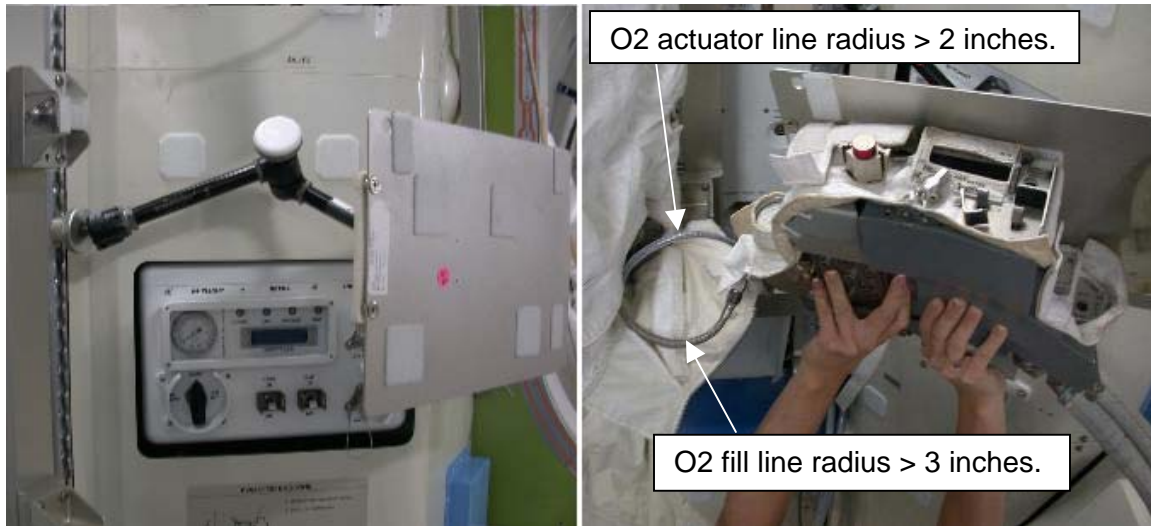


Figure 4.- DCM Restraint Using PCS Mounting Bracket.

ORU Kit

If reinstalling DCM onto another HUT/PLSS

15. Cover DCM and HUT interfaces with Teflon squares; secure with Kapton tape. Refer to Figure 5.

If DCM to be stowed standalone

16. Install HUT to DCM interface covers.

PLSS interface is shown in Figure 5.

Cover DCM and HUT interfaces similarly.

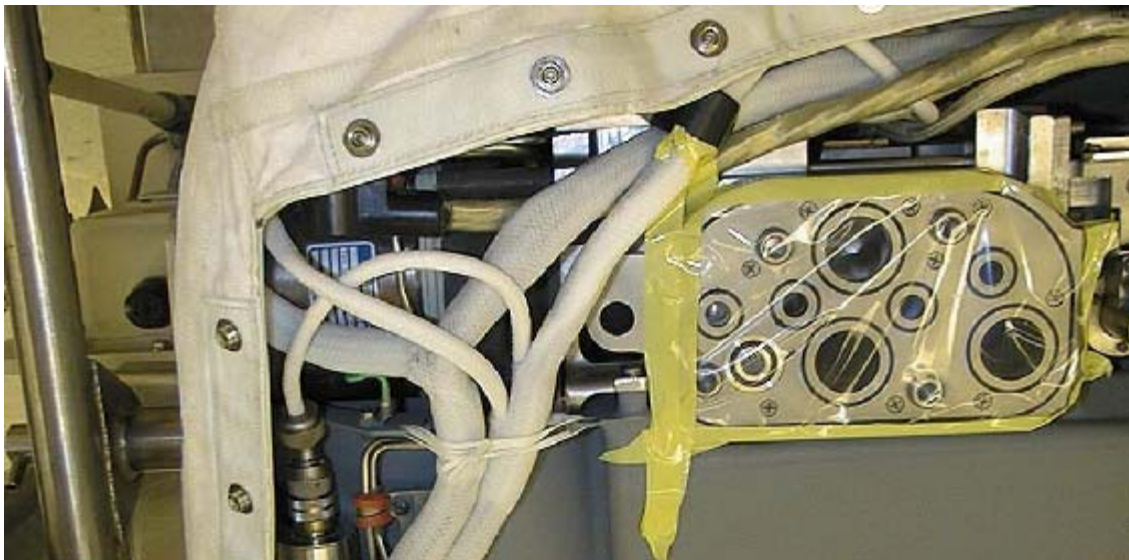


Figure 5.- Protective Covering.

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2.440 HUT/PLSS DISCONNECTION

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I

(30 minutes)

OBJECTIVE:

To perform an on-orbit demate of the Hard Upper Torso (HUT) from the Primary Life Support Subsystem (PLSS).

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

1. Don static wrist tether.

√Static Wrist Tether→|← lower PLSS battery attach post

NOTE

Do not demate the electrical connectors at the DCM.

- PLSS 2. √Color-coded Electrical Connectors (two) ←|→ PLSS Connector Bracket

Refer to Figure 1.

If not disconnected, perform the following

- PLSS 3. Color-coded Electrical Connectors (two) ←|→ PLSS Connector Bracket
4. Cover electrical connectors/receptacles with J4A (PLSS) and P4A (DCM), J3A (PLSS) and P3A (DCM) connector covers.

2.440 HUT/PLSS DISCONNECTION

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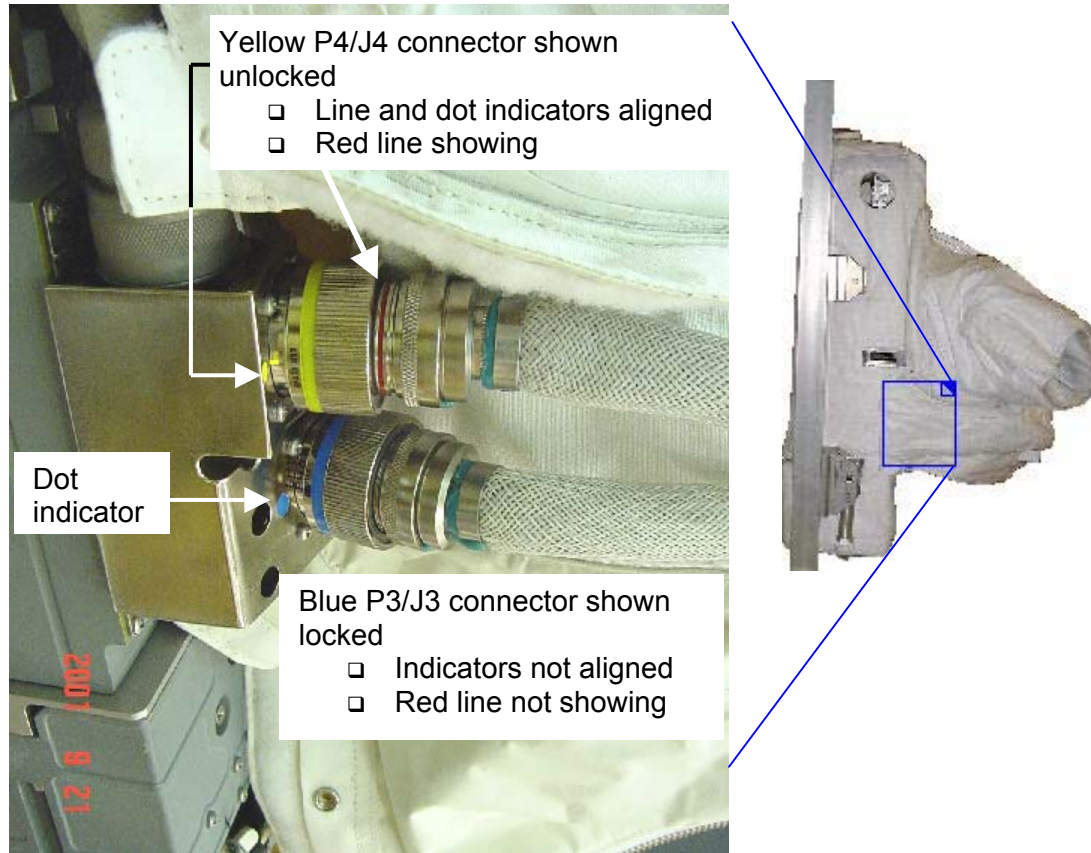


Figure 1.- PLSS Color-Coded Electrical Connector Bracket.

HUT 5. P10 ←|→ J10 by pushing the rotary assist tab ↻

Cover electrical connectors/receptacles with P10B (PLSS) and J10 (HUT) connector covers.

Restrain P10 to PLSS TMG using rotary assist tab.

Refer to Figure 2.

NOTE

Handle the HUT Glove Voltage Regulator using the mount, not the wiring to avoid overstressing the wires.

6. In the left TMG tunnel, remove voltage regulator from covering.

PLSS J5 ←|→ HUT Glove Voltage Regulator REBA Connector

Refer to Figure 3.

Temporarily stow voltage regulator in covering.

2.440 HUT/PLSS DISCONNECTION

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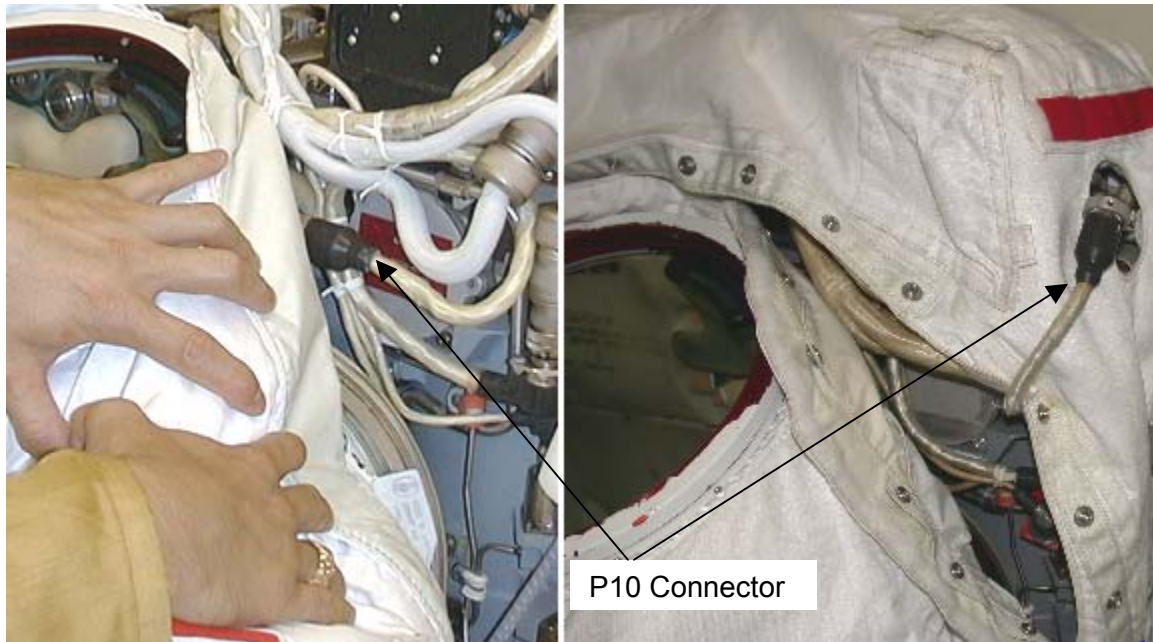


Figure 2.- P10 Electrical Connector (left: installed, right: stowed).

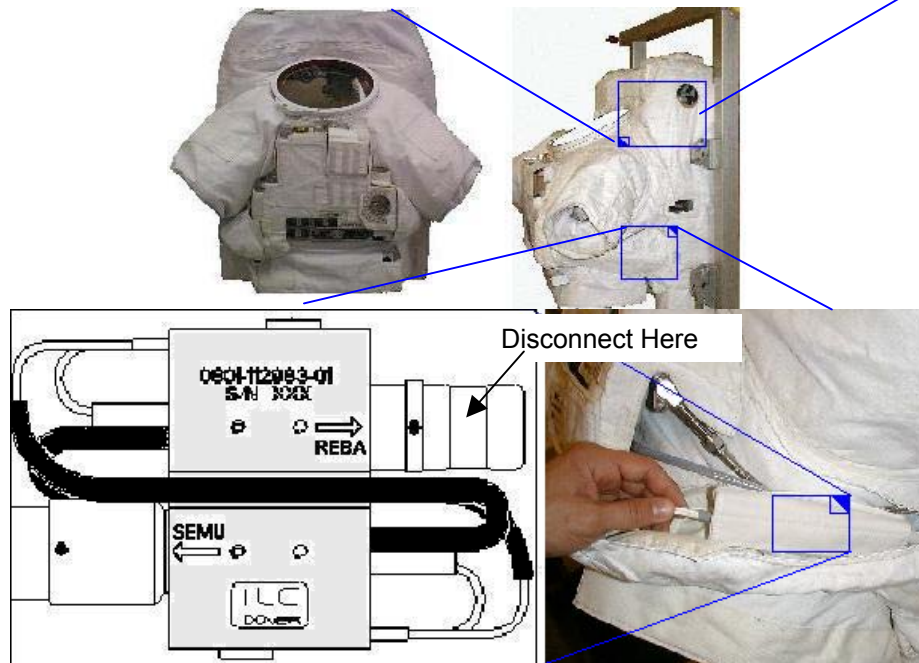


Figure 3.- Glove Heater Voltage Regulator.

7. Doff static wrist tether.

HUT 8. Remove upper rear tube shield from inside HUT.

NOTE

Tube shields are custom fit to each HUT.
They should remain with the original HUT.

2.440 HUT/PLSS DISCONNECTION

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9. Disengage slide-locks (two) on the HUT/PLSS interface pad.
Refer to Figure 4.

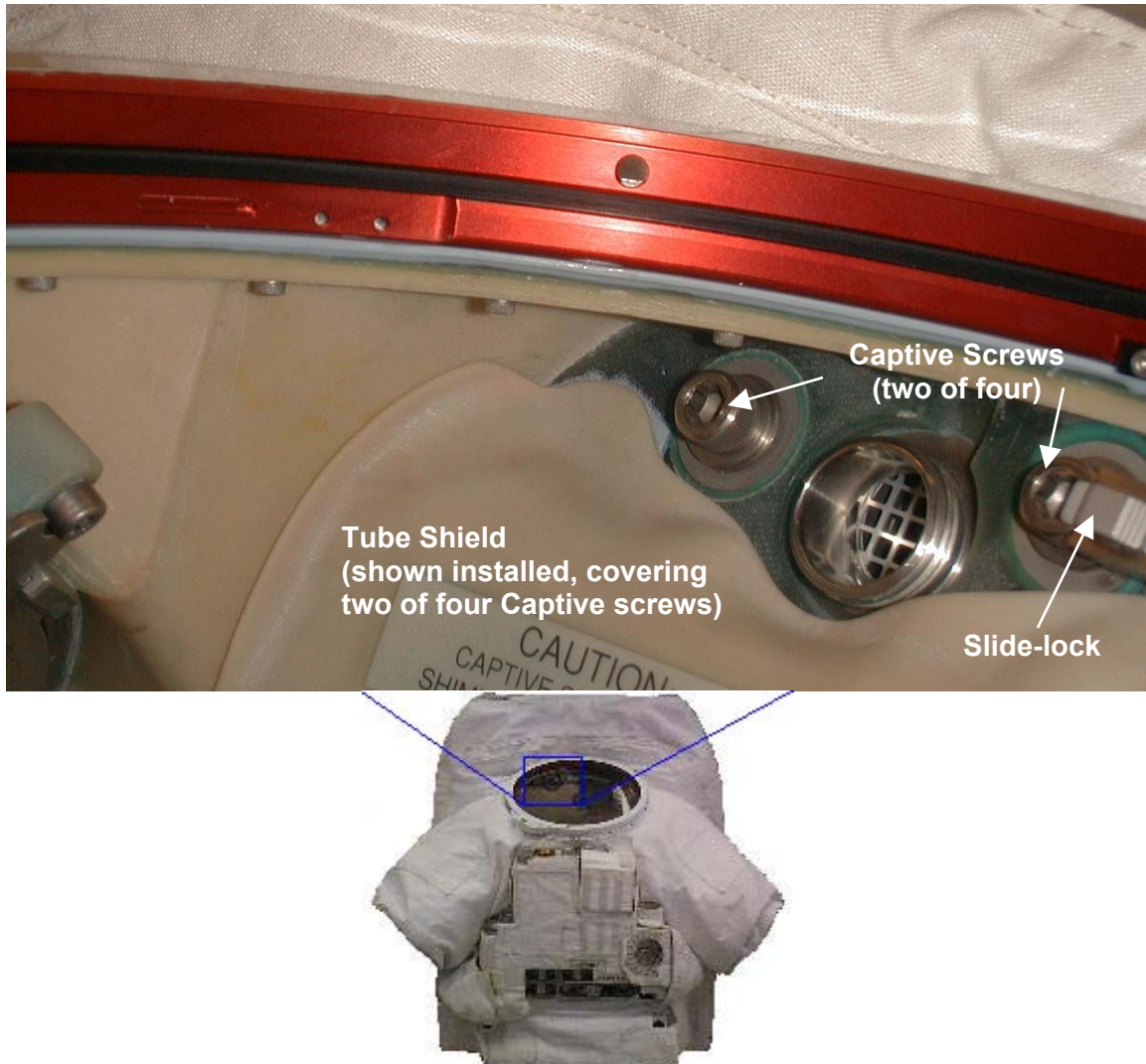


Figure 4.- PLSS-to-HUT Interface.

10. Captive screws (four) ⤴ using 1/4" x 5" Ball Nose Driver, 4" Ext., and Ratchet 3/8" Drive.
11. ✓ No items are restraining the HUT to the PLSS
- HUT 12. Tip HUT forward to clear alignment pin; carefully lift and separate the HUT from the PLSS.
13. Inspect HUT/PLSS interface pad for water.
If water present, dry with absorbent sheets (from ORU Tool Kit) by blotting.

2.440 HUT/PLSS DISCONNECTION

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ORU Kit

If reinstalling HUT onto another PLSS

14. Cover both PLSS and HUT interfaces with Teflon squares or covers; secure with electrical tape.
Refer to Figure 5.

If HUT to be stowed standalone

15. Install HUT to PLSS interface covers.



Figure 5.- Protective Covering.

16. Reinstall upper rear tube shield inside HUT by mating Velcro. PLSS interface is shown in Figure 5. Cover HUT interface similarly.

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2.445 HUT/PLSS CONNECTION

(ISS EVA SYS/7A - ALL/FIN 2)

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I

(30 minutes)

OBJECTIVE:

To perform an on-orbit mate of the Hard Upper Torso (HUT) to the Primary Life Support Subsystem (PLSS).

- HUT 1. Remove upper rear tube shield from inside HUT at the HUT/PLSS interface pad, temporarily stow.

NOTE

Tube shields are custom fit to each HUT.
They should remain with the original HUT.

- HUT/
PLSS 2. Remove protective covers from PLSS-to-HUT interfaces.

- PLSS 3. Inspect PLSS interface plate for water.
If water present, dry with absorbent sheets (from ORU Tool Kit) by blotting.

4. ✓ PLSS interface plate free of corrosion, nicks, cuts, abrasions
✓ All O-seals are present with no damage or flat spots

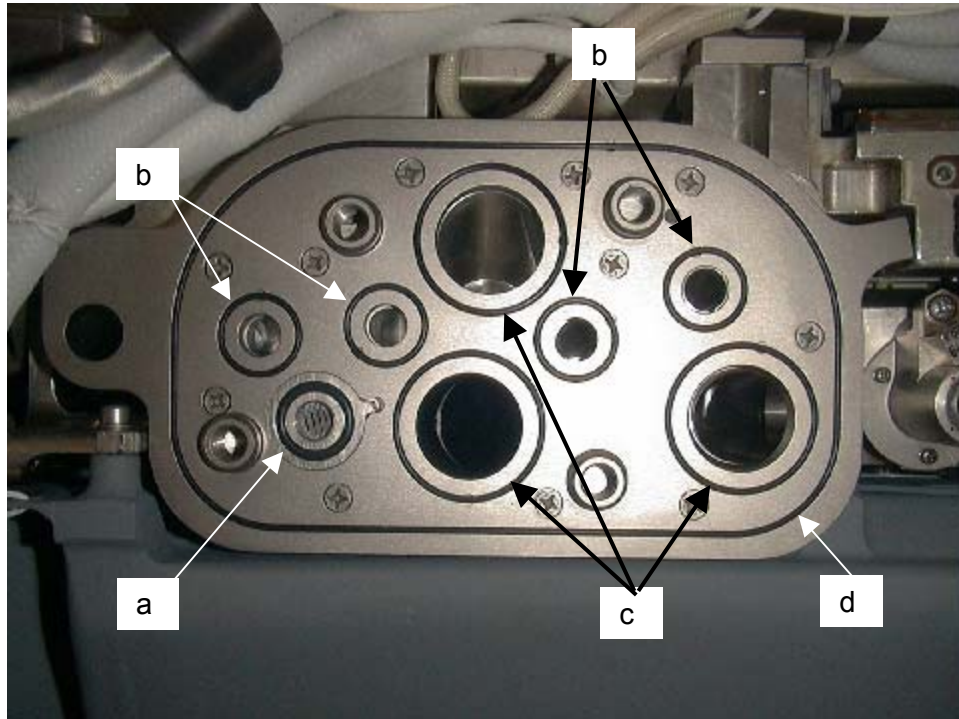
Refer to Figure 1.

If necessary, use seal removal tool and spare interface seals (EMU ORU Tool Kit).

2.445 HUT/PLSS CONNECTION

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a	STSV047N112	PLSS Interface, FW T8 Filter, O-seal spare
b	STSV047N016	PLSS Interface, LCG Port, O-seal spare
c	STSV047N025	PLSS Interface, Vent Loop, O-seal spare
d	STSV047N049	PLSS Interface, Secondary, O-seal spare

Figure 1.- PLSS Interface and O-Seal Part Numbers.

HUT 5. ✓HUT is free of unrestrained items

NOTE

The flap of PLSS TMG above the LTA connection must be flattened prior to HUT installation.

PLSS 6. ✓TMG is not blocking HUT or PLSS interfaces

7. ✓HUT and PLSS interfaces are free of debris, damage, and restricted passageways

8. ✓Captive screws (four) are backed out

2.445 HUT/PLSS CONNECTION

(ISS EVA SYS/7A - ALL/FIN 2)

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9. As required, install foot restraint to aid in HUT positioning.

CAUTION

If there is any interference during mating of HUT to PLSS, stop until interference can be resolved. Maintain clearance between PLSS and HUT interface pads during connection of HUT lower mounts. Avoid kinking of the O2 line and actuator cable during HUT installation.

NOTE

Steps 10 and 11 are performed simultaneously.

10. Carefully position the replacement HUT above the PLSS interface plate. Refer to Figure 2.
11. Lower HUT onto PLSS, engaging HUT lower mounts on PLSS Mounting Guides.

√Alignment pin on HUT pad aligns with PLSS Interface Alignment Hole

√HUT lower mounts engaged by pulling HUT forward

Refer to Figures 3 and 4.

2.445 HUT/PLSS CONNECTION

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Figure 2.- PLSS Interface Pad.

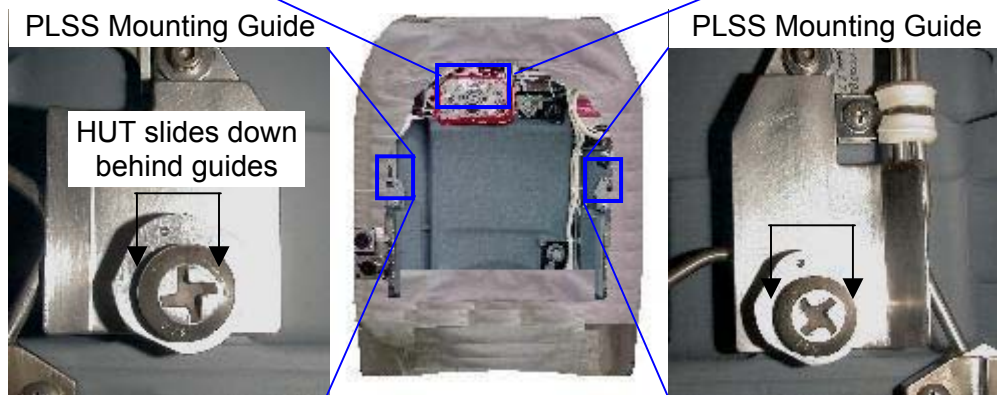


Figure 3.- PLSS-to-HUT Mounting Guides.

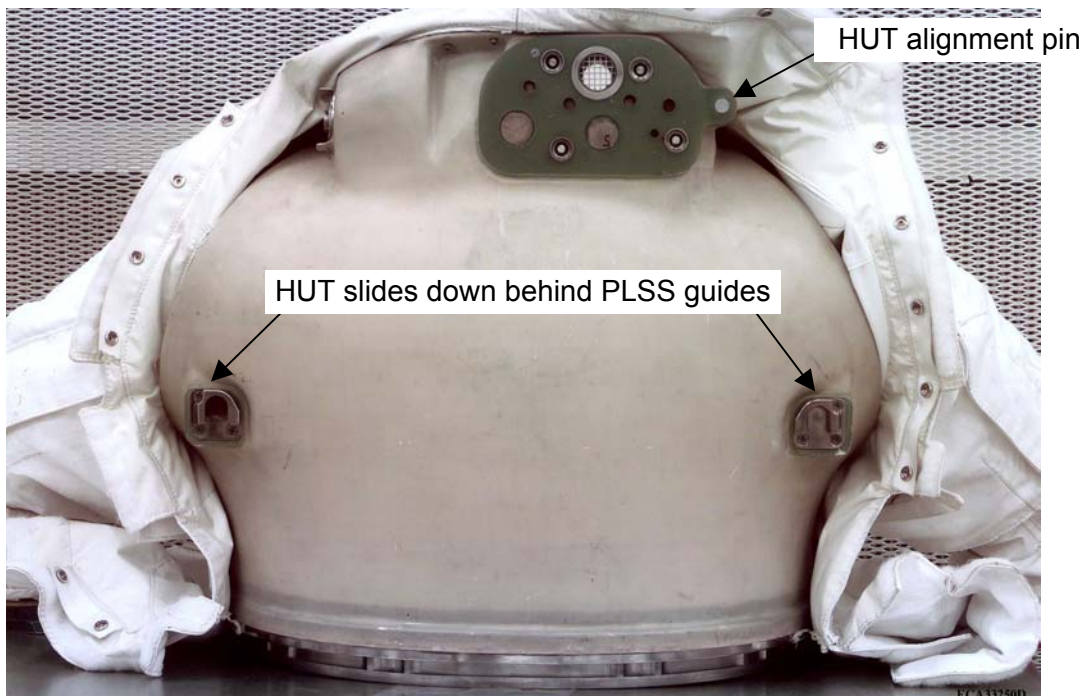


Figure 4.- HUT Lower Mounts (Trailer Hitches).

2.445 HUT/PLSS CONNECTION

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- Interior 12. Hand tighten HUT captive screws (four) in cross pattern.
Torque HUT captive screws (four) in cross pattern to 160 in-lbs using
1/4" x 5" Ball Nose Driver with 30-200 in-lbs Trq wrench.
Refer to Figure 5.

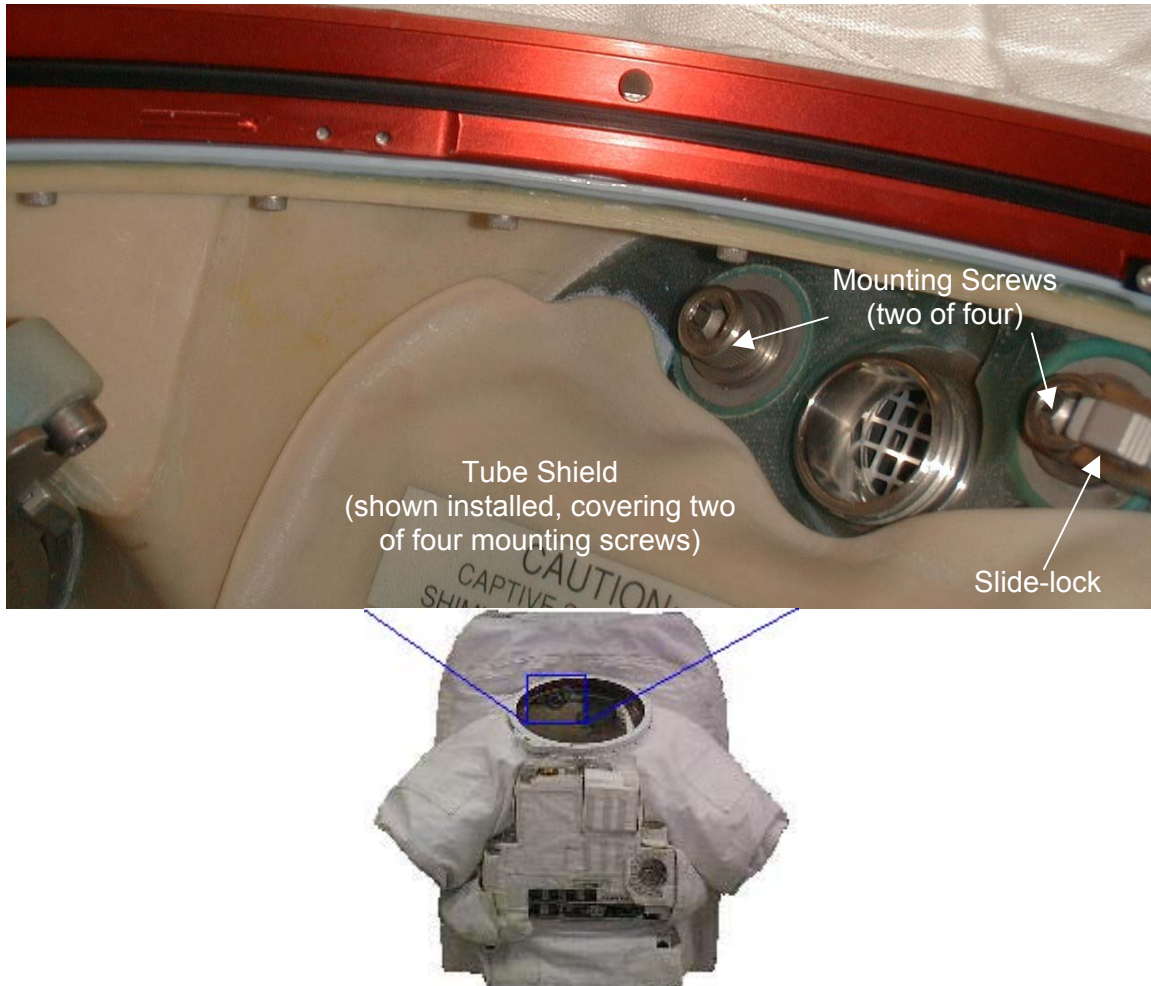


Figure 5.- HUT-to-PLSS Interface.

13. Engage slide-locks (two).
Reinstall upper rear tube shield inside HUT by mating Velcro.

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

14. Don static wrist tether.

Static wrist tether →|← lower EMU PLSS battery attach post

2.445 HUT/PLSS CONNECTION

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HUT 15. Unstow P10 electrical connector from temporary location on PLSS TMG.

P10 →|← J10 using alignment marks and rotary assist

Remove covers, if required.

Refer to Figure 6.

NOTE

Handle the HUT Glove Voltage Regulator using the mount,
not the wiring to avoid overstressing the wires.

16. PLSS J5 →|← HUT Glove Voltage Regulator REBA connection

Install in cover.

Refer to Figure 7.

2.445 HUT/PLSS CONNECTION

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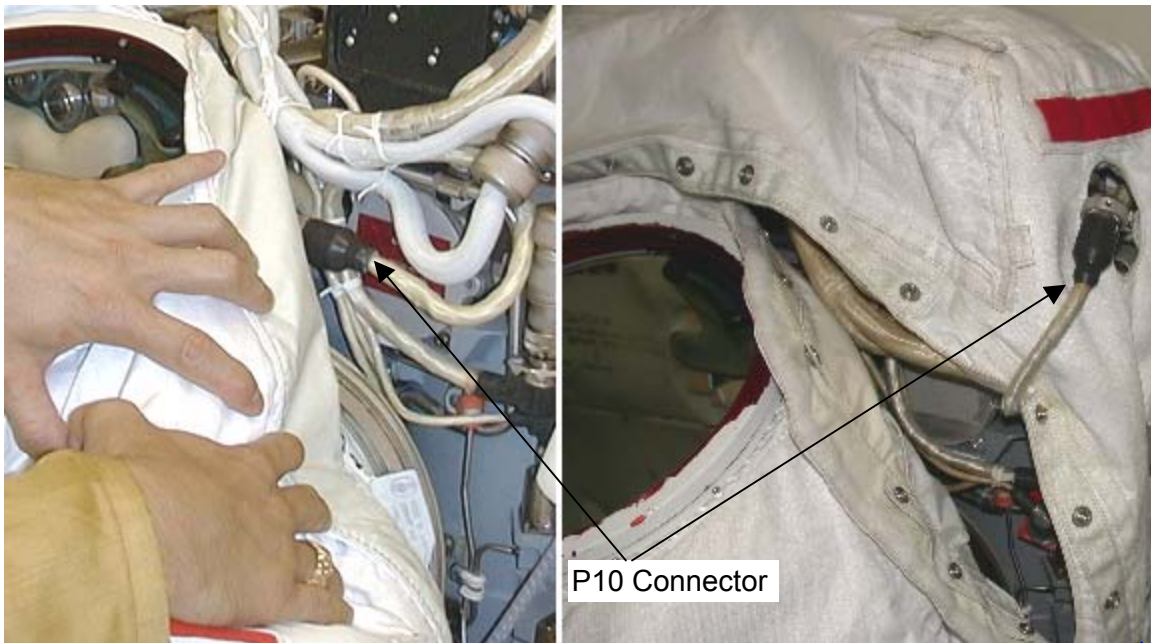


Figure 6.- P10 Electrical Connector (Left: installed, Right: stowed).

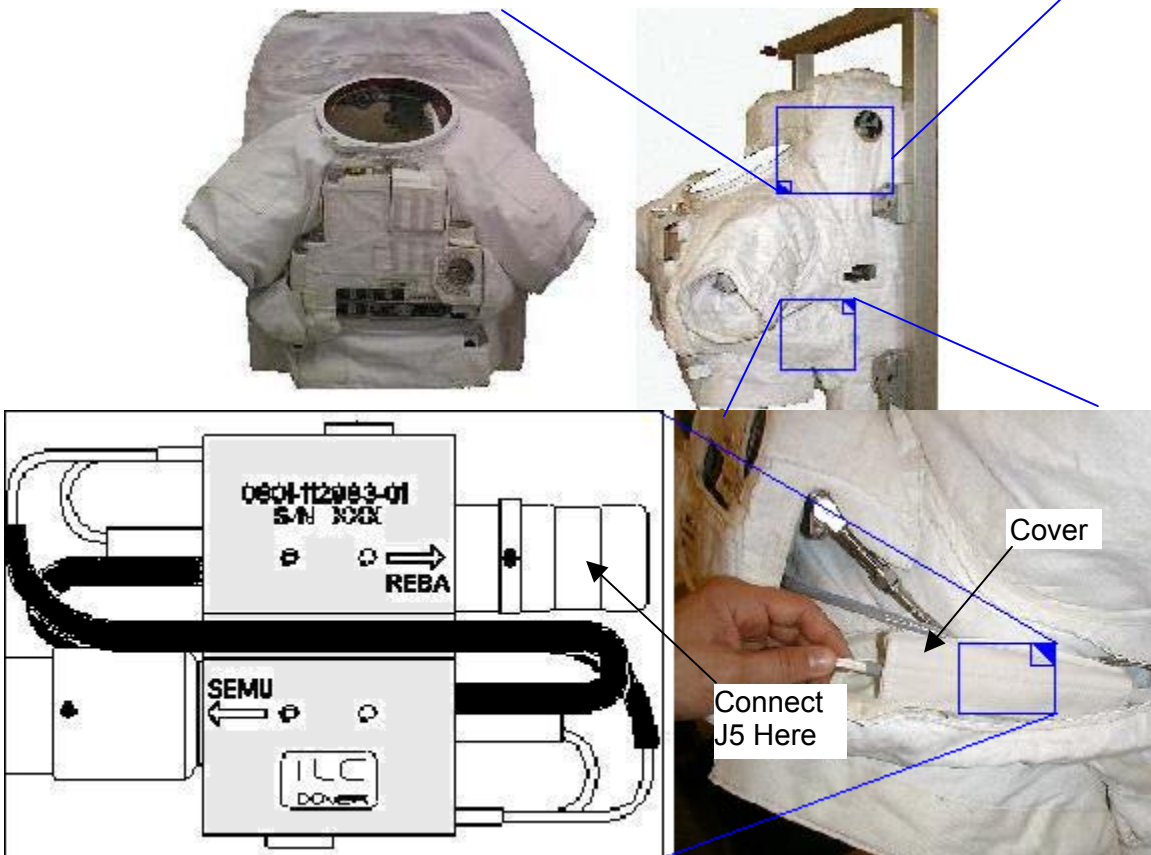


Figure 7.- Glove Heater Voltage Regulator.

2.445 HUT/PLSS CONNECTION

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If DCM already installed on HUT

NOTE

1. Some electrical connectors can be technique sensitive and may require persistence.
2. The Connector Gripper Band from the EMU ORU Tool Kit may be used to aid in turning the connector.

PLSS

17. Remove electrical tape or covers from electrical connectors. Inspect connectors.

18. P3 TO J3 (BLUE) ELECTRICAL CONNECTION

Refer to Figure 8.

18.1 ✓ Red unlock line on Blue P4 Electrical connector is visible

18.2 Blue P3 →|← Blue J3 by aligning blue line on Electrical connector with blue dot on PLSS connector bracket

18.3 Hold wire harness ⊥ PLSS connector bracket.

18.4 Push in and ↻ P3 connector until the connector lock clicks.

18.5 ✓ Red unlock line is no longer visible

PLSS

19. P4 TO J4 (YELLOW) ELECTRICAL CONNECTION

Refer to Figure 8.

19.1 ✓ Red unlock line on Yellow P4 Electrical connector is visible

19.2 Yellow P4 →|← Yellow J4 by aligning yellow line on Electrical connector with yellow dot on PLSS connector bracket

19.3 Hold wire harness ⊥ PLSS connector bracket.

19.4 Push in and ↻ P4 connector until the connector lock clicks.

19.5 ✓ Red unlock line is no longer visible

2.445 HUT/PLSS CONNECTION

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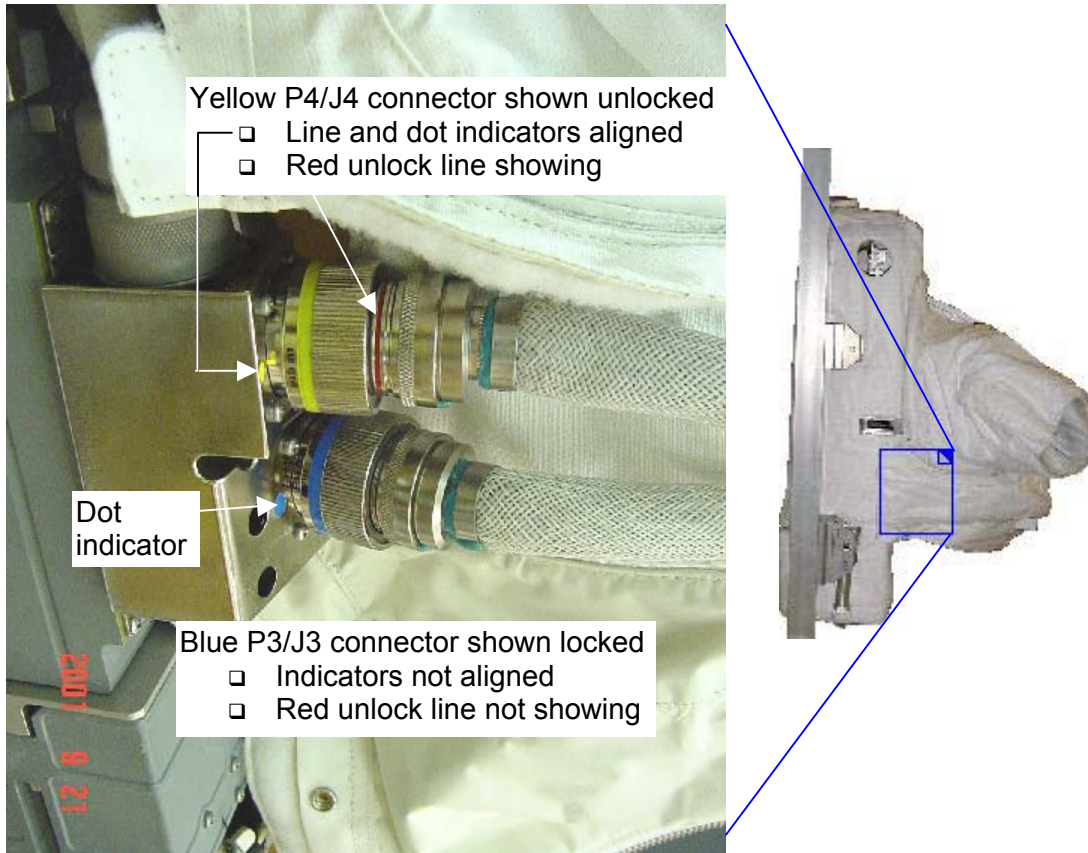


Figure 8.- PLSS Color-Coded Electrical Connector Bracket.

20. Doff static wrist tether, leave clip attached to post.

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2.450 DCM INSTALLATION

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I

(30 minutes)

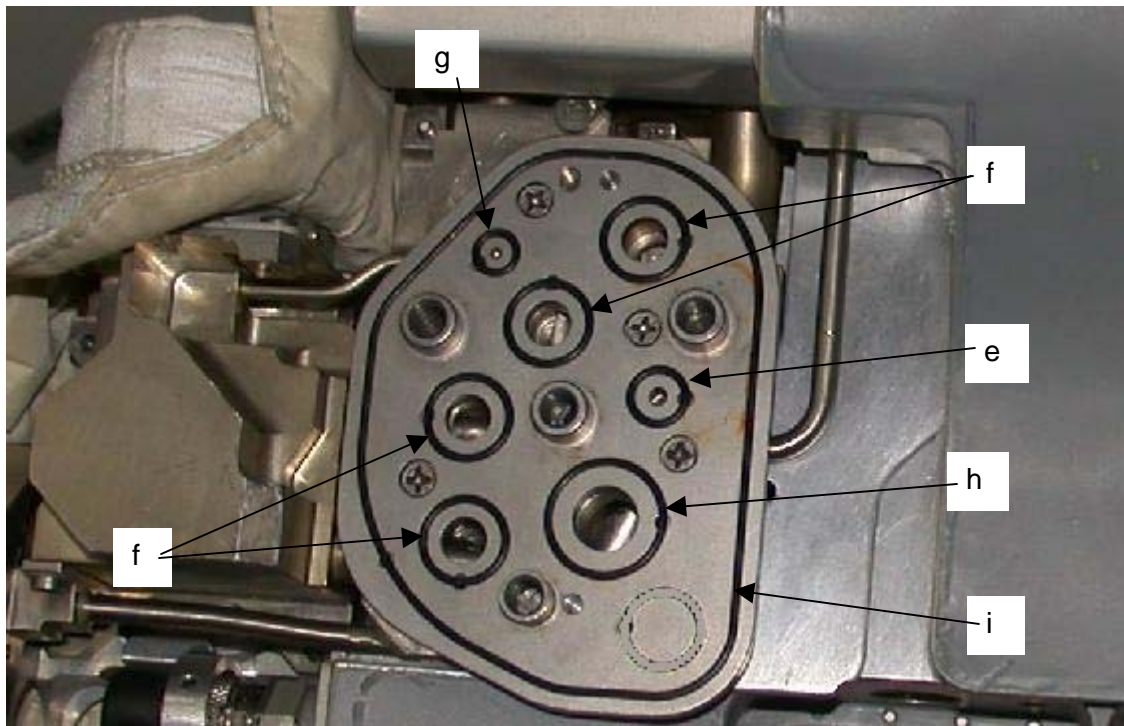
OBJECTIVE:

To perform an on-orbit installation of the Display and Control Module (DCM) to the Hard Upper Torso (HUT).

- HUT 1. Remove front tube shield from front, interior of HUT.
- DCM/
HUT 2. Remove protective covers from HUT and DCM interfaces.
3. Inspect HUT/DCM interface plate for water.
If water present, dry with absorbent sheets (from ORU Tool Kit) by blotting.
4. ✓DCM interface free of corrosion, nicks, cuts, abrasions
✓All O-seals are present with no damage or flat spots

Refer to Figure 1.

If necessary, use seal removal tool and replacement seals (from ORU Tool Kit).



e	STSV047N011	DCM Interface, FW O-seal spare
f	STSV047N014	DCM Interface, LCG water, O-seal spare
g	STSV047N009	DCM Interface, Sense port, O-seal spare
h	STSV047N016	DCM Interface, Purge valve port, O-seal spare
i	STSV047N042	DCM Interface, Secondary, O-seal spare

Figure 1.- DCM Interface and O-Seal Part Numbers.

2.450 DCM INSTALLATION

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- HUT
5. Run the adjustable shim nut on HUT upper DCM shim mount ↻ flush with boss on HUT using hands; do not tighten.
Run the adjustable shim nut on HUT lower DCM shim mount ↻ flush with boss on HUT using hands; do not tighten.
Refer to Figure 2.

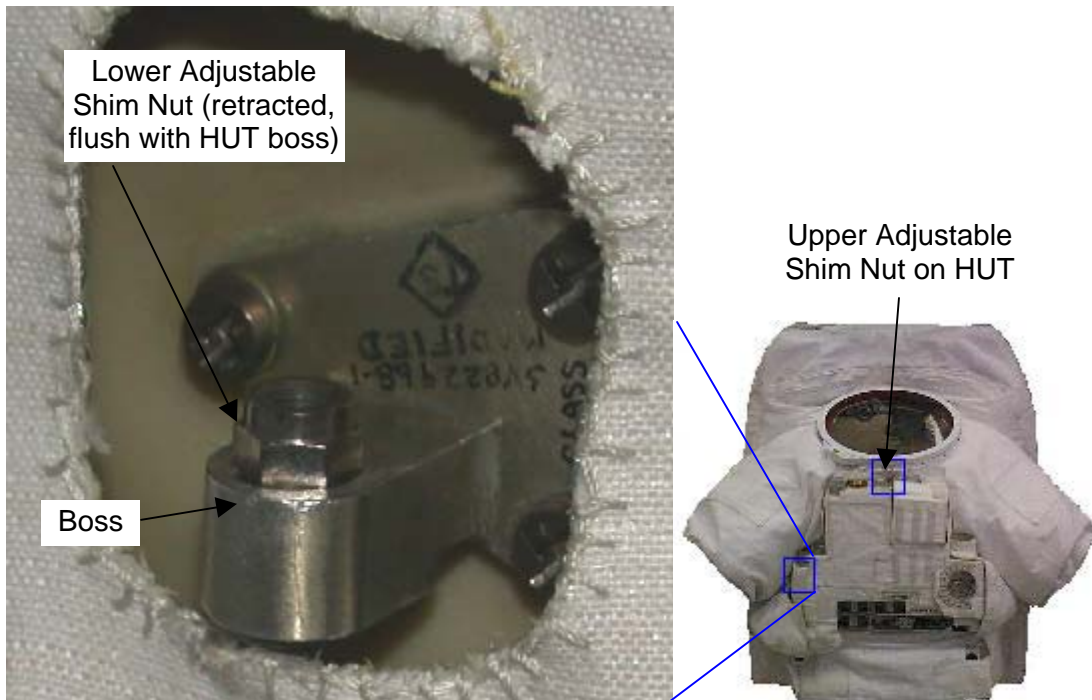


Figure 2.- Preparing Adjustable Shim Nuts for DCM Alignment.

6. ✓Captive screws (four) are backed out at interface pad on front of HUT

CAUTION

If there is any interference during the mating of the DCM to HUT, stop until interference can be resolved.

7. Ensure adequate clearance around the DCM upper mount.

- DCM
8. ✓TMG is not blocking HUT/DCM interfaces
✓Captive screws (two) are backed out of both DCM shim mounts
✓Interfaces are free from FOD

Refer to Figure 3.

2.450 DCM INSTALLATION

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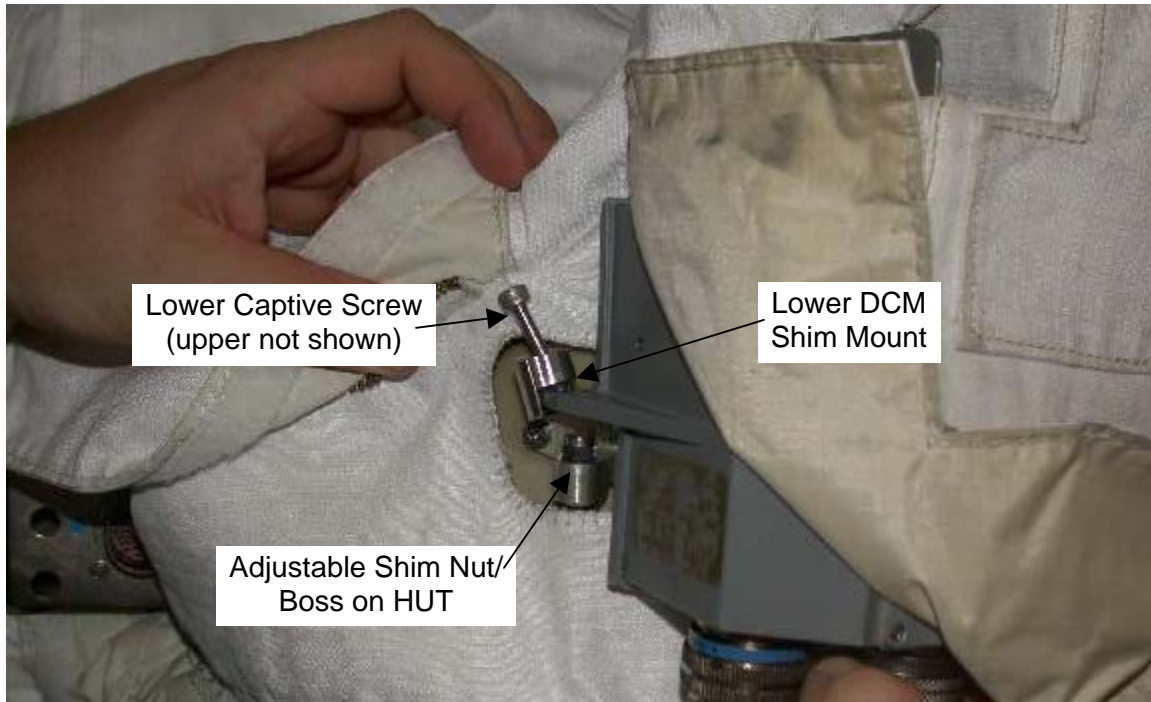


Figure 3.- Preparing Shim Mount Captive Screws for DCM Alignment.

CAUTION

Avoid overstressing or kinking O2 fill line and O2 actuator lines. The bend radii should be no less than the following:

O2 fill line - 3-inch bend radius

O2 actuator cable - 2-inch bend radius

9. Carefully align DCM to HUT.

✓HUT interface pad and DCM interface plate aligned and flat

✓Upper and lower DCM captive screws/shim mounts aligned with adjustable shim mounts

- | | |
|----------|---|
| HUT | 10. Inside HUT, hand tighten captive screws (four) in cross pattern (or use 3/16" Hex Head Drive by hand as desired). |
| | 11. Captive fastener in upper DCM shim mount, ↻ 2 to 3 turns using 5/32" x 5" Ball Nose Driver. |
| | 12. Captive fastener in lower DCM shim mount, ↻ 2 to 3 turns using 5/32" x 5" Ball Nose Driver. |
| Interior | 13. Torque HUT captive screws (four) in cross pattern to 80 in-lbs using 3/16" Hex Head and 3/8" Trq Wrench. |

2.450 DCM INSTALLATION

(ISS EVA SYS/7A - ALL/FIN 2)

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14. Engage slide-locks (two).
15. Reinstall front tube shield of HUT at HUT/DCM interface pad by mating Velcro.

DCM

16. sw COMM mode → PRI
17. If required, back out adjustable shim nuts with 5/16" Open End Wrench until they are flush against upper and lower captivation boss, ↺ 2 turns; do not tighten.
To maintain the best alignment, tighten captive fasteners on the upper mount first.
Refer to Figure 4.
18. Hold adjustable shim nut in place with 5/16" Open End Wrench.
Tighten captive fastener on upper mount to 35 in-lbs using 5/32" x 5" Ball Nose Driver and 30-200 in-lbs Trq Wrench.
Refer to Figure 5.
19. Repeat step 18 for lower mount.

2.450 DCM INSTALLATION

(ISS EVA SYS/7A - ALL/FIN 2)

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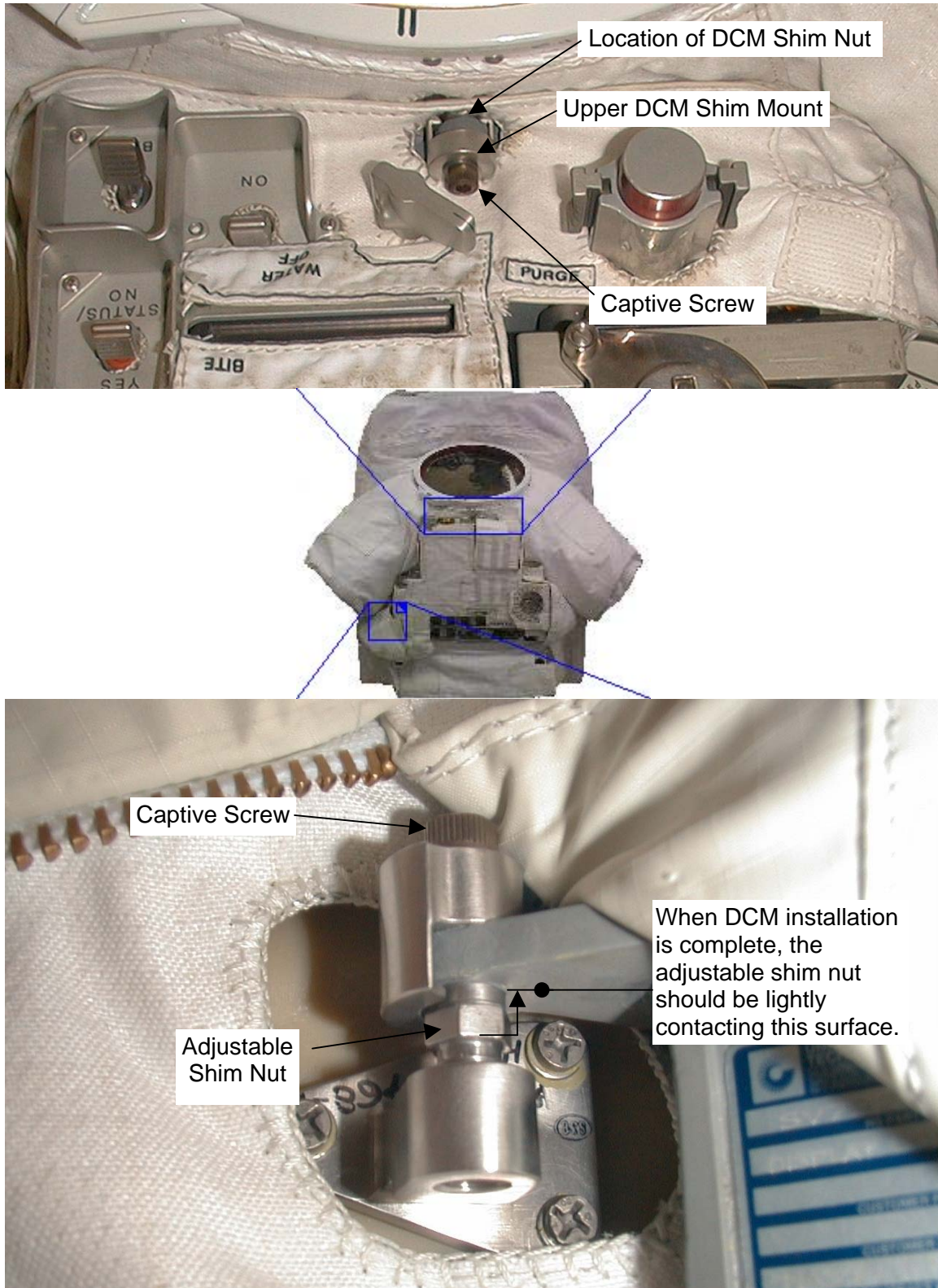


Figure 4.- Upper and Lower DCM Shim Mounts.

2.450 DCM INSTALLATION

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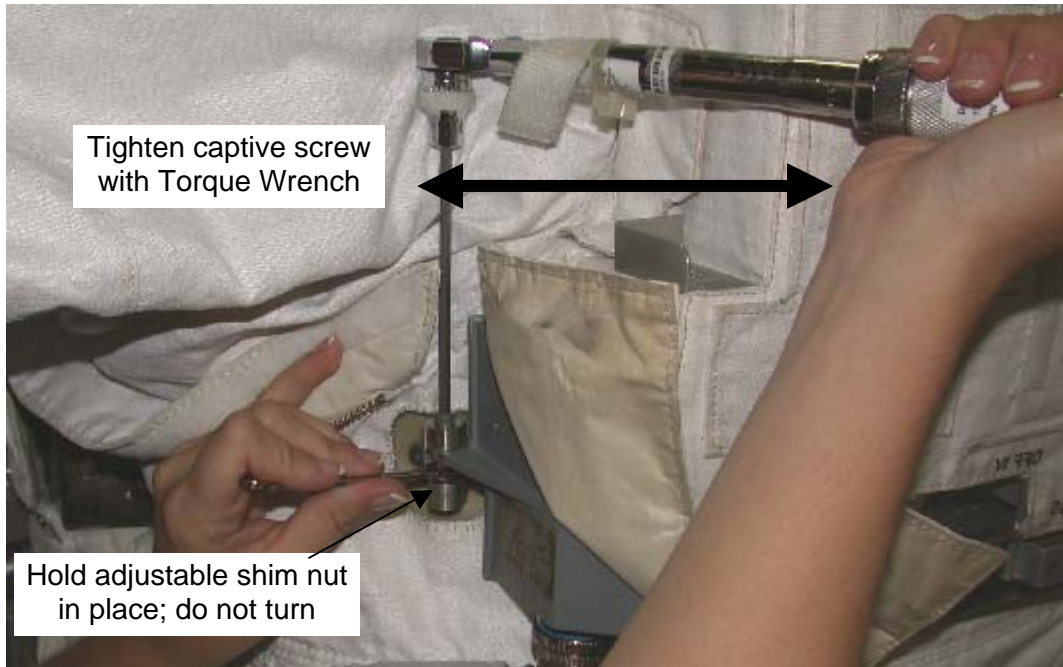


Figure 5.- Tightening Captive Screw on DCM Shim Mounts (Lower Shown).

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

20. Don static wrist tether.

√Static wrist tether →|← lower EMU PLSS battery attach post

21. Remove electrical tape or covers from J4A, P4A, J3A, and P3A electrical connectors.
Inspect connectors.

NOTE

1. Some electrical connectors can be technique sensitive and may require persistence.
2. The Connector Gripper Band from the EMU ORU Tool Kit may be used to aid in rotating the connector.

PLSS 22. P3 TO J3 (BLUE) ELECTRICAL CONNECTION

Refer to Figure 6.

22.1 √Red unlock line on Blue P4 Electrical connector is visible

22.2 Blue P3 →|← Blue J3 by aligning blue line on Electrical connector with blue dot on PLSS connector bracket

2.450 DCM INSTALLATION

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22.3 Hold wire harness \perp PLSS connector bracket.

22.4 Push in and \curvearrowright P3 connector until the connector lock clicks.

22.5 \surd Red unlock line is no longer visible

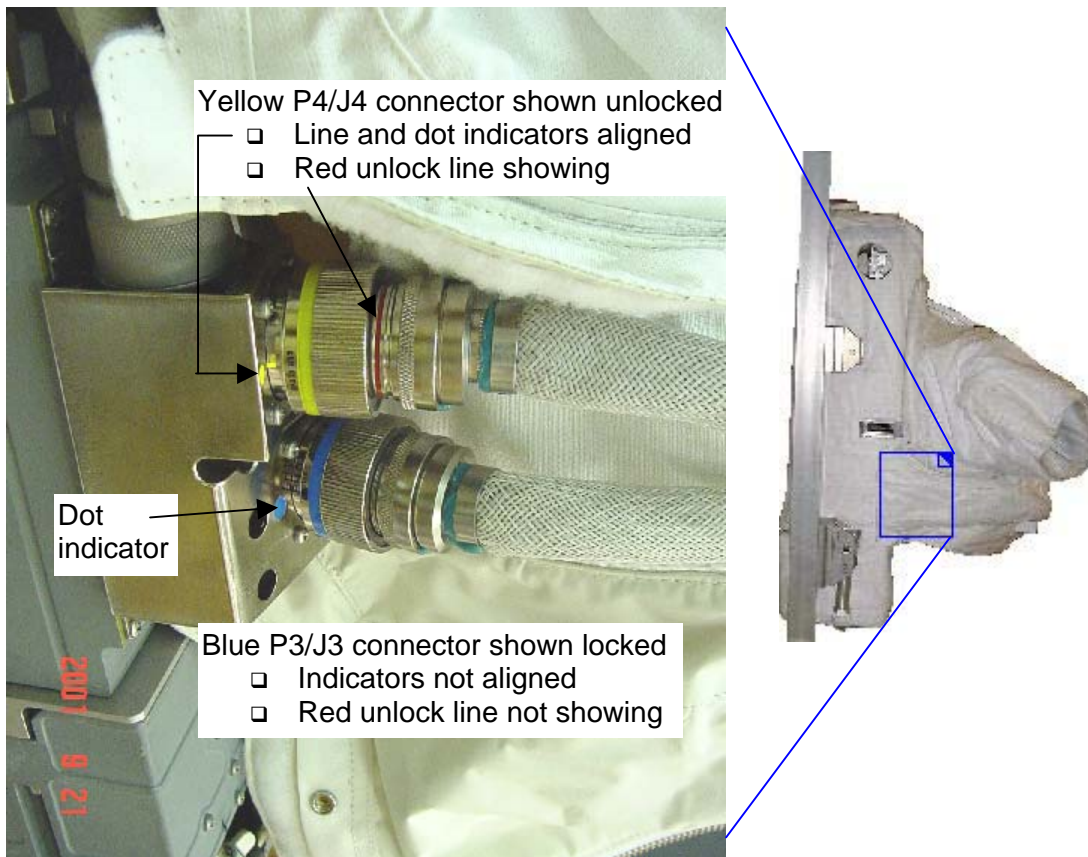


Figure 6.- PLSS Color-Coded Electrical Connector Bracket.

PLSS 23. P4 TO J4 (YELLOW) ELECTRICAL CONNECTION

Refer to Figure 6.

23.1 \surd Red unlock line on Yellow P4 Electrical connector is visible

23.2 Yellow P4 \rightarrow | \leftarrow Yellow J4 by aligning yellow line on electrical connector with yellow dot on PLSS connector bracket

23.3 Hold wire harness \perp PLSS connector bracket.

23.4 Push in and \curvearrowright P4 connector until the connector lock clicks.

23.5 \surd Red unlock line is no longer visible

24. Doff static wrist tether and disconnect clip from lower EMU PLSS battery attach post.

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(10 minutes)

OBJECTIVE:

To perform an on-orbit installation of the O2 Actuator to the Display and Control Module (DCM).

DCM 1. ✓TCV cover removed

CAUTION	
1.	Avoid overstressing or kinking O2 fill line and O2 actuator lines. The bend radii should be no less than the following: O2 fill line - 3-inch bend radius O2 actuator cable - 2-inch bend radius
2.	Avoid contact with the microswitches within the microswitch assembly of the O2 actuator Refer to Figure 1.

2. Unstow O2 actuator from snap strap on left side of PLSS.
3. Install O2 actuator on DCM by aligning the slot with the tab on the alignment bracket as shown in Figure 1.

2.455 O2 ACTUATOR INSTALLATION

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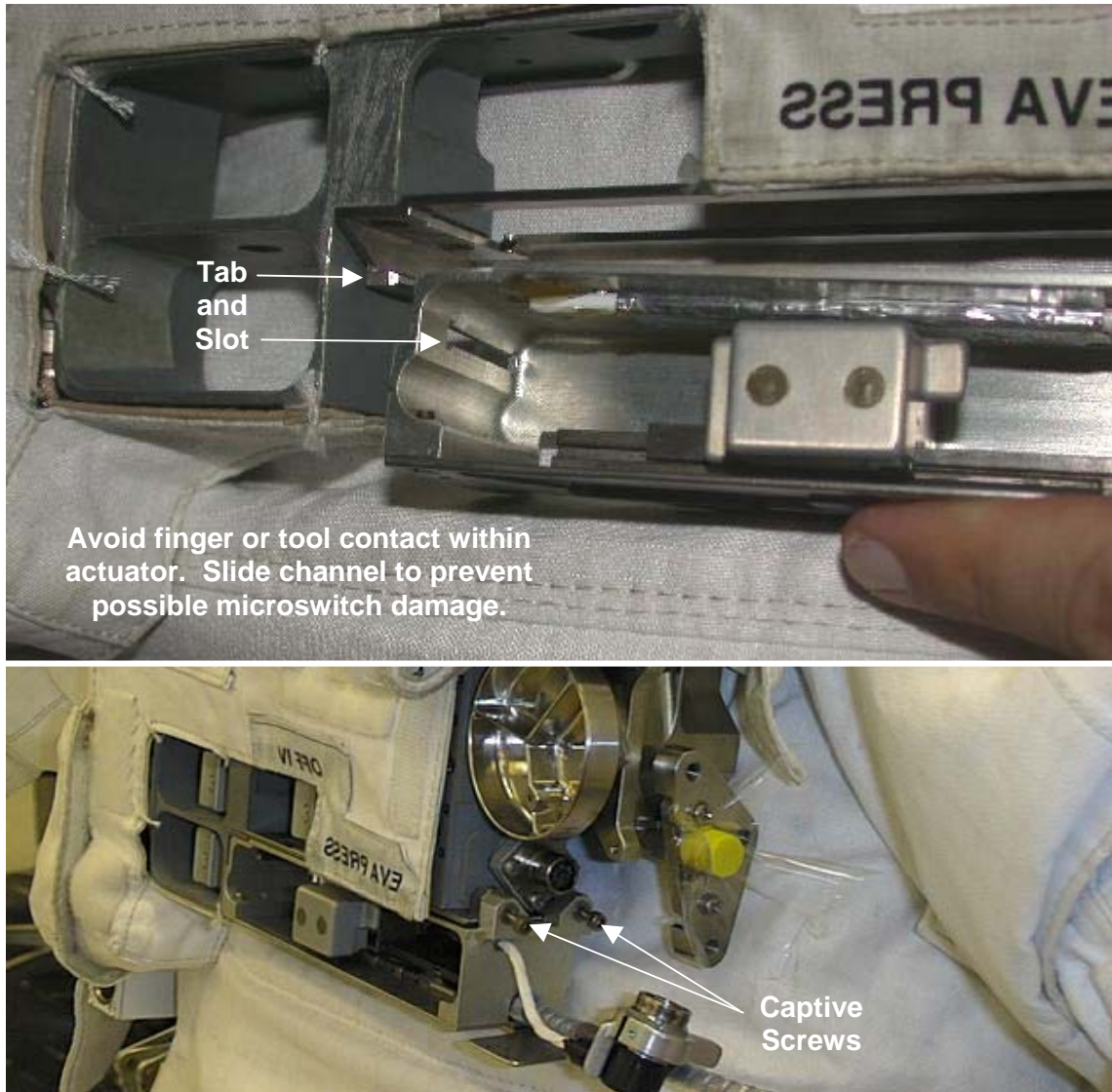


Figure 1.- O2 Actuator Installation.

4. Captive screws (two) ↻ using 7/64" Hex Head Driver and 5-35 in-lbs Trq Driver; torque 9-10 in-lbs.

CAUTION

A static wrist tether must be donned and connected prior to handling electrical connectors on the EMU. The tether may be removed after connector mate/demate is complete.

5. Don static wrist tether.
Static wrist tether →|← lower EMU PLSS battery attach post
6. Electrical covers ←|→ from P37 and J37.

2.455 O2 ACTUATOR INSTALLATION

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7. On left side of DCM housing, P37 →|← J37 using alignment marks; rotary assist tab ↻
Refer to Figure 2.

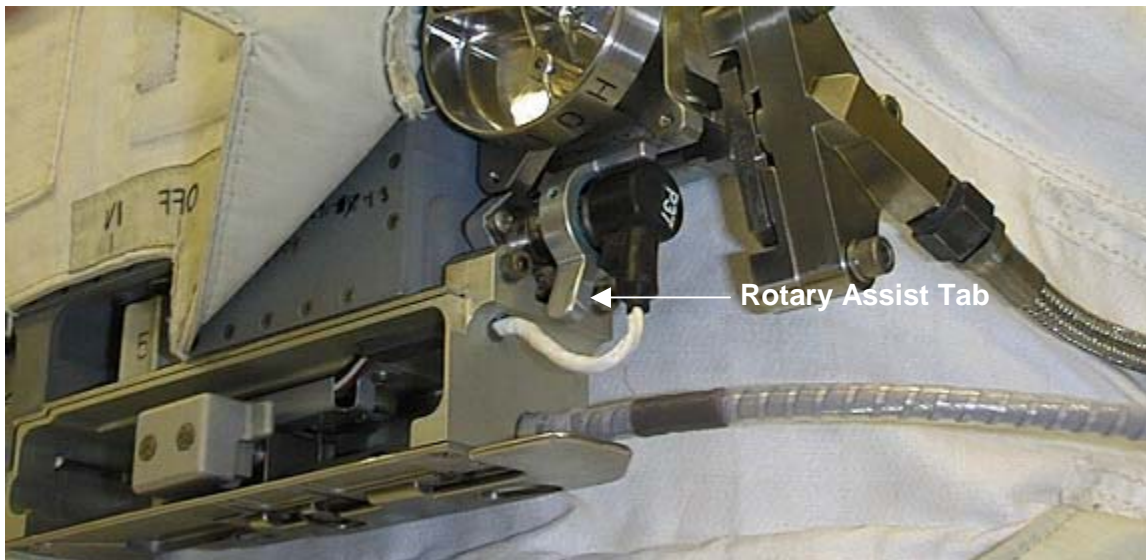


Figure 2.- O2 Actuator and P37 Connector.

8. Doff static wrist tether.

Static wrist tether ←|→ lower EMU PLSS battery attach post

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2.460 O2 LINE INSTALLATION

(ISS EVA SYS/7A - ALL/FIN 2) Page 1 of 3 pages

(10 minutes)

OBJECTIVE:

To perform an on-orbit installation of the oxygen line to the Display and Control Module (DCM).

- PLSS
1. Unstow O2 line from snap strap on left PLSS TMG.
 2. Position Flexible Vent Duct so that air flow is over O2 fill line interface.
 - √Temperature Control Valve (TCV) cover, TMG, and EMU left arm are not blocking flow
 - √Air flow is toward the CCAA HEPA filter inlet

Continue airflow over O2 line interfaces until interface is mated.
Refer to Figure 1.

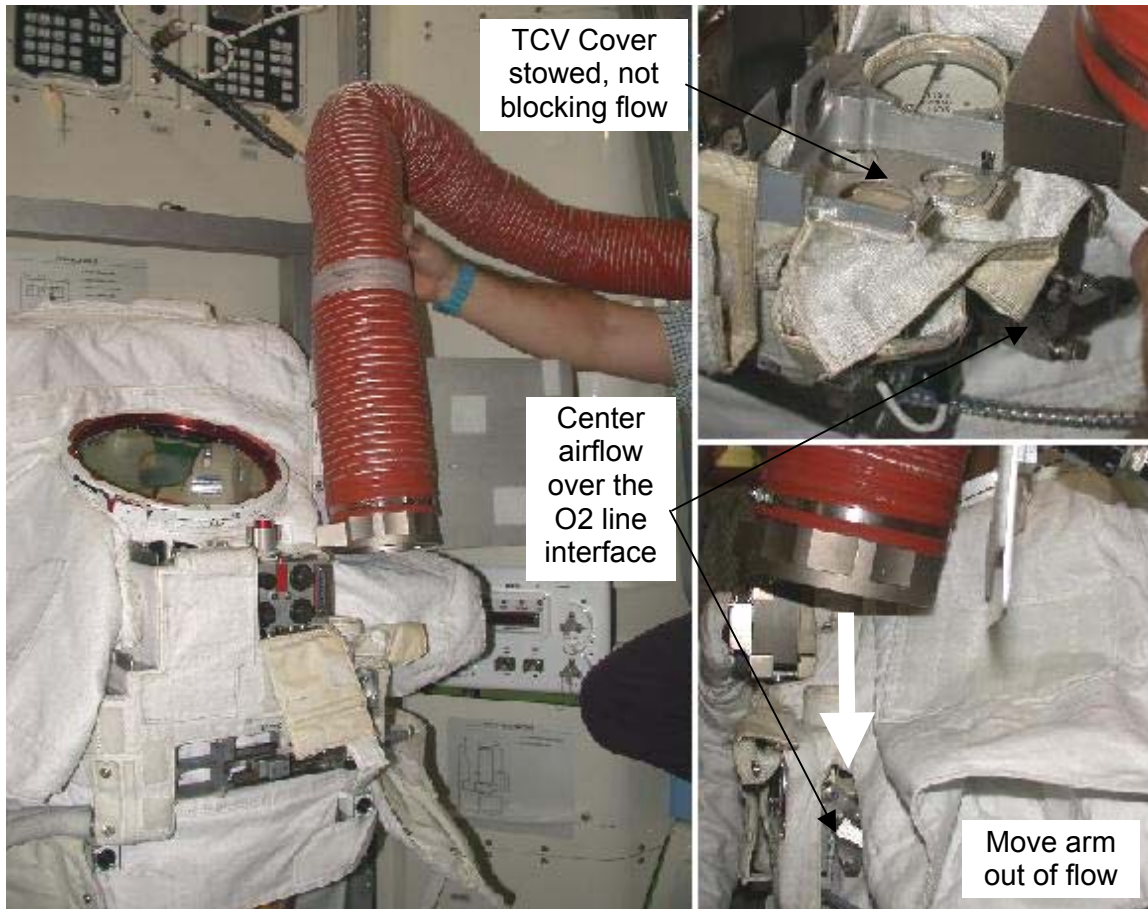


Figure 1.- Flexible Vent Duct Positioning for O2 Fill Line Interface.

- DCM
3. √Temperature Control Valve (TCV) cover removed
 4. Don powder-free Nitrile gloves.

2.460 O2 LINE INSTALLATION

(ISS EVA SYS/7A - ALL/FIN 2) Page 2 of 3 pages

CAUTION

1. Avoid contact with O2 wetted surfaces.
2. Maintain a bend radius greater than 3 inches at all times while handling O2 fill line.

5. Disconnect the O2 Line Covers from the O2 fill line interfaces.
6. Inspect O2 line for debris or damage that could preclude installation.
Inspect DCM O-seal and backup rings.
Refer to Figure 2.
If any contamination present, contact **MCC**

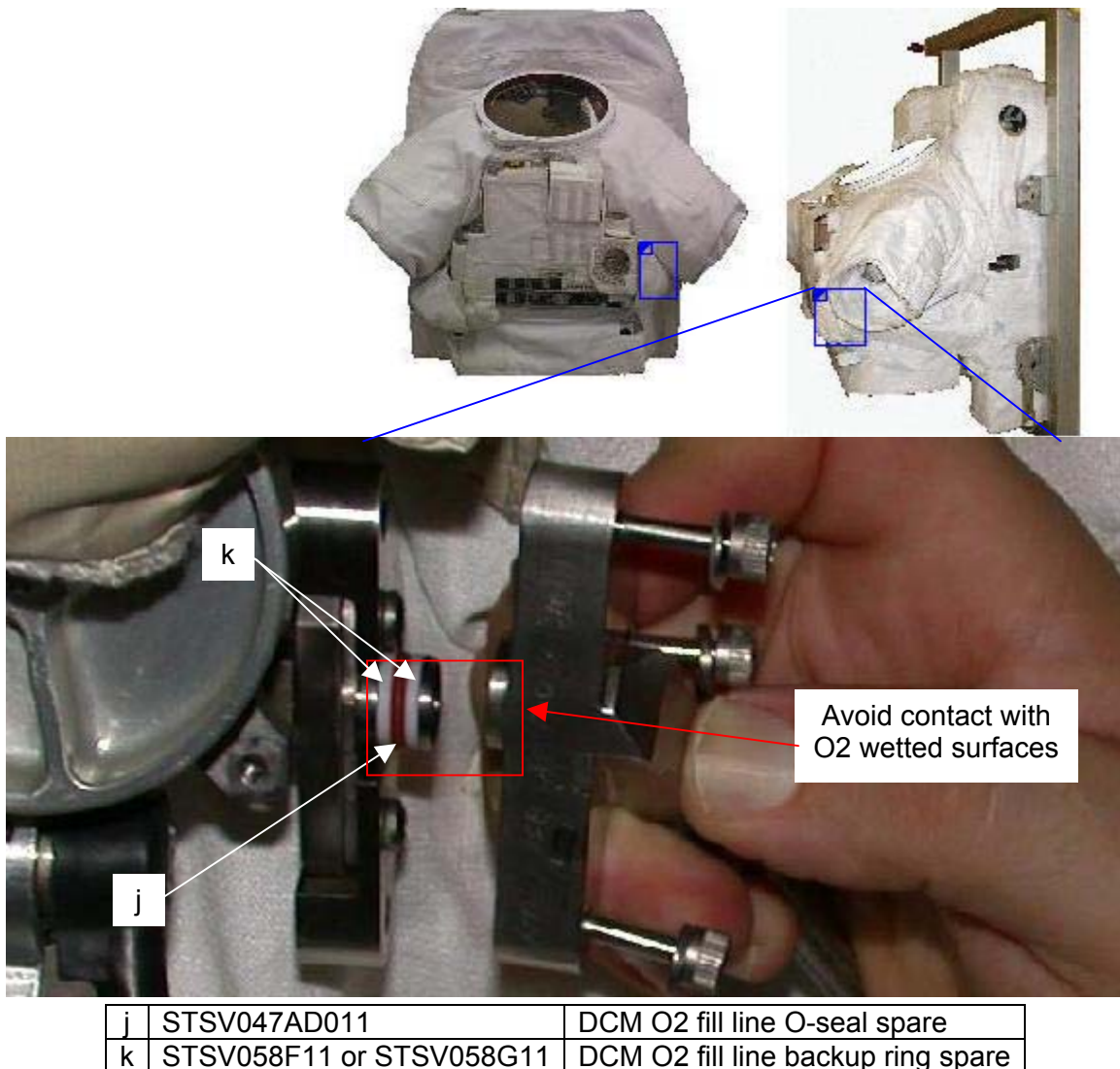


Figure 2.- Primary O2 Fill Line: O-Seal Part Numbers.

2.460 O2 LINE INSTALLATION

(ISS EVA SYS/7A - ALL/FIN 2) Page 3 of 3 pages

CAUTION

1. Maintain alignment of O2 line during installation to avoid damage to the bore on the PLSS side and the O-seal on the DCM side. Refer to Figure 3.
2. Avoid overlapping O2 fill line and O2 actuator cable.

7. Install O2 line onto DCM mounting plate. Hand tighten captive screws (three). Refer to Figure 3.

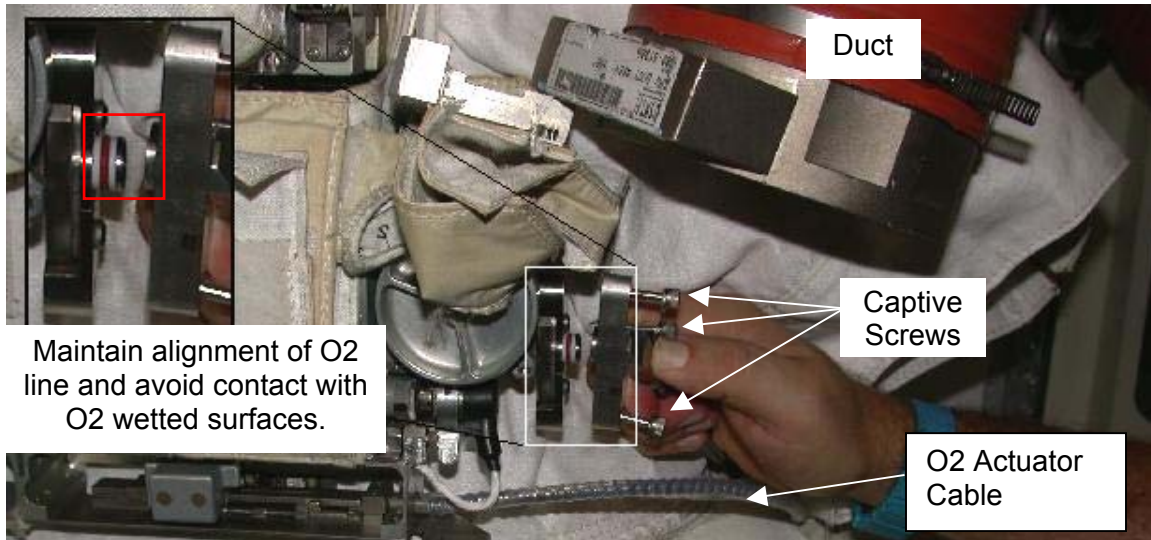


Figure 3.- O2 Line Installation.

8. Torque captive screws (three) to 35 in-lbs using 5/32" x 5" Ball Nose Driver and 30-200 in-lbs Trq Wrench.

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NO IV EVA

	<u>GND</u>	<u>ISS</u>
2.505 EMU DONNING WITHOUT IV.....	447	MPV
2.510 EMU PURGE WITHOUT IV.....	457	MPV
2.515 EMU PREBREATHE WITHOUT IV	459	MPV
CREWLOCK DEPRESS/REPRESS WITHOUT IV CUE CARD.....	463	MPV
2.520 POST EVA WITHOUT IV	465	MPV
2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV.....	471	MPV
2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV	477	MPV
2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV	483	MPV

NO IV EVA

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2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 1 of 9 pages

I

(120 Minutes)

OBJECTIVE:

Don EMUs and prepare Airlock and for an EVA. No IV crewmember is assumed for this procedure.

MCC-H/EV

1. CONFIGURING EVA COMM

- 1.1 Perform {2.701 UHF 1 ORU ACTIVATION}, all (SODF: C&T: NOMINAL: UHF), then:
- 1.2 Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, all (SODF: C&T: NOMINAL: AUDIO), then:

EV1,2

2. REMOVING EQUIPMENT FROM E-LK AND C-LK

- 2.1 Remove from E-Lk
 - All Bags (including those behind Beta cloth)
 - Stage Metox Bag near Node 1 Stbd Hatch
 - 3rd EMU
 - All PHAs
 - Cooling Loop Jumper from EMU Equipment Bag (temporarily stow in EMU Servicing Kit)
 - EMU Servicing Kit
 - All floor and ceiling bin stowed items
- 2.2 Remove loose equipment from C-Lk.
- 2.3 ✓EVA tools and ORUs installed in C-Lk as required for EVA

NOTE

Hatch Handle must be securely stowed in order to Prevent Jamming of Hatch mechanism.

3. CONFIGURING LAB AFT AND NODE FWD HATCHES

Lab Aft

- 3.1 ✓Domed side Hatch Handle in properly stowed position (Handle should be engaged on Handle Stowage Retaining Key, pointing down towards LATCH direction.)
- 3.2 ✓Latch Ratchet – LATCH
- 3.3 ✓Lab Aft Hatch MPEV – CLOSED (✓cap remains removed)
- 3.4 Close Lab Aft Hatch per decal.

Node Fwd

- 3.5 ✓Ribbed side Hatch Handle in properly stowed position (Handle should be engaged on Handle Stowage Retaining Key, pointing up towards UNLATCH direction.)
- 3.6 ✓Latch Ratchet – LATCH
- 3.7 ✓Node 1 Fwd Hatch MPEV – CLOSED (✓cap remains removed)
- 3.8 Close Node 1 Fwd Hatch per decal.

2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 2 of 9 pages

4. Install H-straps in E-Lk for translation assistance.
Install two handrails on E-Lk floor (eight seat track spaces apart)
for foot restraint.

EMU

5. √Comm Cap →|← electrical harness

MCC-H/EV
PCS

6. CONFIGURING OXYGEN SYSTEM

Airlock: ECLSS: Oxygen System

AL Oxygen System

'O2 Hi Pressure Supply Valve'

cmd Open (√Position – Open)

'High Pressure'

√UIA Supply Press: 5343 to 6308 kPa (775 to 915 psia)

7. EMU POWERUP

EV1,2 UIA

- 7.1 √sw UIA PWR EV-1,2 (two) – OFF
√UIA PWR EV-1,2 LEDs (four) – Off
√EMU O2 SUPPLY PRESS gauge: 850 to 950

C-Lk
wall

- 7.2 Remove SCU from stowage straps and pouches.
Transfer SCU to E-Lk.

DCM

- 7.3 Open DCM Cover.
Affix cover with Velcro to DCM.

- 7.4 SCU →|← DCM

√SCU locked

- 7.5 sw POWER → BATT

CAUTION

EMU must be on BATT power when
UIA suit power is turned on.

PSA

- 7.6 √sw SUIT SELECT (two) – OFF
√sw EMU MODE EMU 1,2 (two) – PWR

- 7.7 sw MAIN POWER → ON

√MAIN POWER LED – On

- 7.8 sw SUIT SELECT (two) → EMU 1,2

√EMU 1,2 LEDs (two) – On

√EMU 1,2 Volts: 18.0 to 19.0

2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 3 of 9 pages

UIA 7.9 sw PWR EV-1,2 (two) → ON

√PWR EV-1,2 EMU LEDs (two) – On

DCM 7.10 sw POWER → SCU

7.11 √STATUS: BATT VDC ≥ 20.3

UIA 8. OXYGEN EMU 1,2 vlv (two) → OPEN

CAUTION

Flexible Ventilation Duct must be removed from Crewlock prior to taking EMU fan to ON to avoid ice formation on UIA water lines.

9. Rotate Flexible Ventilation Duct out of C-Lk.

PREP FOR DONNING (30 MINUTES)

☐☐☐ 10. Waist ring ←|→ HUT

Temporarily stow LTA.
Remove Multiple Water Connector cover.

☐☐☐ 11. Helmet ←|→ HUT

Temporarily stow helmet.

☐☐☐ 12. Unstow EMU TV power cable.

☐☐☐ 13. EMU TV power cable ←|→ Ground plug

☐☐☐ 14. √Gloves ←|→ EMU
√Wrist disconnects – op

☐☐☐ 15. Remove dosimeter from in-flight garments.
Insert dosimeter in LCVG.

☐☐☐ 16. Don MAG, TCU, LCVG, biomed.

2.505 EMU DONNING WITHOUT IV

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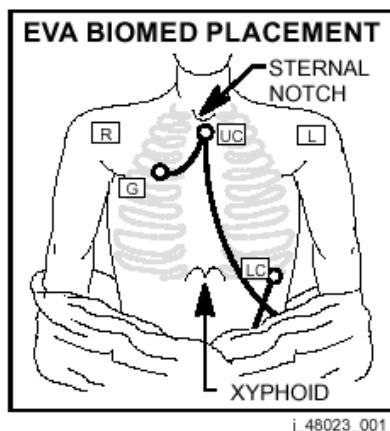


Figure 1.- Nondisposable Biomed Configuration.

- ☐☐☐ 17. Unstow biomed pigtail from EMU Servicing Kit.

Biomed pigtail →|← signal conditioner

Biomed pigtail →|← electrical harness

- ☐☐☐ 18. sw COMM mode → PRI

- DCM ☐☐☐ 19. √sw Comm FREQ – LOW

- ☐☐☐ 20. Don comm cap.

- ☐☐☐ 21. Verify biomed, EMU data, RF comm with **MCC-H**.

- DCM ☐☐☐ 22. sw COMM mode → HL

- ☐☐☐ 23. Doff comm cap.

- ☐☐☐ 24. Biomed pigtail ←|→ electrical harness

- ATU4,5 ☐☐☐ 25. √EACP Y-cable →|← ATUs

pb PTT → Press

pb 1 → Press

- EACP ☐☐☐ 26. √EACP Y-cable →|← EACP

sw PWR → ON

√EMU 1,2 mode sel (two) – DUAL

- ATU
4,5 ☐☐☐ 27. √Display – '1TG' and other loops, as required
√Display – 'DUAL'

2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 5 of 9 pages

SAFER PREP (15 MINUTES)

EV1,2

- ☐☐☐ 28. Remove SAFER from Stowage Bag.
Remove Stowage Straps (two) from thruster towers.
Stow Stowage Straps in EMU Equipment Bag.
- ☐☐☐ 29. Inspect thruster tower hinges and tower latches.

√TMG not blocking thrusters
- ☐☐☐ 30. √TMG clear from SAFER striker plate on EMU PLSS
- ☐☐☐ 31. Remove Inhibitor.
Close, fasten port cover.
- ☐☐☐ 32. MAN ISOL vlv → OP (dn)
- ☐☐☐ 33. Latch → PRELOAD
- ☐☐☐ 34. Latch ↶ to recess butterfly in housing.

CAUTION

Latch ↶ past softstop can bind latch.

- ☐☐☐ 35. Latch ↶ to softstop.

If required
- ☐☐☐ 36. Latch ↷ to align latch collar with square bolt head
- ☐☐☐ 37. Latch → ENG

EMU DONNING (55 MINUTES)

EV1,2

- ☐☐☐ 38. √EDDA latched; rotate EDDA handles to 45°
- ☐☐☐ 39. Take one aspirin tablet (325 mg), if not taken previously.

DCM

- ☐☐☐ 40. √STATUS: SOP P: 5410 to 6800 (compare with gauge)
- ☐☐☐ 41. √sw REBA – OFF (toward left arm of suit)
- ☐☐☐ 42. √Waist ring – op
- ☐☐☐ 43. Don LTA (attach donning handles as required).

2.505 EMU DONNING WITHOUT IV

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If boot bladder manipulation required

44.1 Boot ←|→ Leg (sizing ring)

44.2 Pull up excess boot bladder around full circumference of boot disconnect.

WARNING

Keep bladder material clear of threads during reconnection of boot.

44.3 Boot ←|→ Leg (sizing ring)

44.4 Lock 1 → LOCK

√All locks (three per boot) are engaged.

NOTE

Perform the remainder of donning serially as indicated.

EV1

☐☐☐ 45. √Suit arms aligned

☐☐☐ 46. Stow IV glasses as required.

☐☐☐ 47. Don thumb loops.

☐☐☐ 48. √Drink vlv position

☐☐☐ 49. √Biomed connector is outside of HUT

☐☐☐ 50. √Thermal cover clear of waist ring.

☐☐☐ 51. Waist ring → engage position

☐☐☐ 52. Don HUT.

☐☐☐ 53. Release thumb loops.

☐☐☐ 54. √Suit arms aligned

☐☐☐ 55. Don EV glasses as required.
Don comm cap.

☐☐☐ 56. sw Comm FREQ → PTT

√Comm with **MCC-H**

sw Comm FREQ → LOW

2.505 EMU DONNING WITHOUT IV

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☐☐☐ 57. Biomed pigtail →|← electrical harness

☐☐☐ 58. LCVG →|← Multiple Water Connector

√Multiple Water Connector locked

☐☐☐ 59. √Thermal cover clear of waist ring

☐☐☐ 60. Waist ring →|← HUT

√Waist ring locked

☐☐☐ 61. Remove donning handles.
Install donning handles on EMU2 or stow in EMU
Equipment Bag.
Cover waist ring.

☐☐☐ 62. sw COMM Mode → PRI

☐☐☐ 63. √Drink vlv position

☐☐☐ 64. √Mic boom position

☐☐☐ 65. EV1 egress EDDA.

EV2 ☐☐☐ 66. Repeat steps 45 to 64 for EV2.

EV2 DCM ☐☐☐ 67. sw FAN → ON

☐☐☐ 68. √Electrical harness clear of neck ring

☐☐☐ 69. Don helmet.

√Helmet locked

☐☐☐ 70. EMU TV power cable →|← EMU TV

DCM ☐☐☐ 71. Temp control vlv → Max C; check cooling

* If cooling insufficient, contact **MCC-H**.

☐☐☐ 72. Temp control vlv → as required

☐☐☐ 73. Remove water switch guard.
Stow water switch guard in EMU Equipment Bag.

☐☐☐ 74. Wrist rings → engage position

☐☐☐ 75. √sw Glove heater (two) – OFF

2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 8 of 9 pages

☐☐☐ 76. Don comfort gloves, wristlets.

☐☐☐ 77. Lower arm power harness cables →|← Gloves

☐☐☐ 78. Don EV gloves.

√EV gloves locked

☐☐☐ 79. Tighten palm restraint straps.

☐☐☐ 80. Stow lower arm power harness slack under arm TMG.

☐☐☐ 81. √Cuff C/L position
√Wrist mirrors installed

DCM ☐☐☐ 82. O2 ACT → IV

☐☐☐ 83. √Helmet purge vlv – cl, locked

DCM ☐☐☐ 84. PURGE vlv → cl (dn)

☐☐☐ 85. √Cooling

* If cooling insufficient
* | Depress and hold pump priming valve on back
* | of EMU (30 seconds minimum.) MMOD Shield
* | Handling Tool can be used for access with
* | gloved hand. Cycle Temperature Control Valve
* | as needed.

DCM ☐☐☐ 86. Temp control vlv → as required

EV1 ☐☐☐ 87. Repeat steps 67 to 87 for EV1.

EMU CHECK (5 MINUTES)

EV1,2 88. Report the following verifications to **MCC-H**:

<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√Wrist rings	– covered
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√Waist rings	– covered
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw WATER	– OFF
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw POWER	– SCU
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw FAN	– ON
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√sw Comm FREQ	– LOW
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√Helmet purge vlv	– cl, locked
DCM <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	√PURGE vlv	– cl (dn)

NOTE

During leak check, when **SET O2 IV** message displayed, wait 30 seconds and √SUIT P gauge stable (4.2 to 4.4) before moving O2 ACT → IV.

2.505 EMU DONNING WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 9 of 9 pages

- ☐☐☐ 89. sw DISP → STATUS until LEAK CHECK? displayed
sw DISP → YES, follow displayed instructions.

```
*****
* If LEAKAGE HI SUIT P X.X
*   Perform {2.115 FAILED LEAK CHECK
*   (14.7/10.2 PSIA)} (SODF: ISS EVA SYS:
*   EMU CONTINGENCY), then:
*****
```

EV2

- ☐☐☐ 90. Egress EDDA.
- ☐☐☐ 91. Go to {2.510 EMU PURGE WITHOUT IV} (SODF: ISS
EVA SYS: NO IV EVA).

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2.510 EMU PURGE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 1 of 1 page

I

OBJECTIVE:

Purge cabin air from the EMU prior to in-suit prebreathe.

NOTE

Flex arms and legs periodically and avoid overcooling during purge/prebreathe.

EV1,2 DCM

1. O2 ACT → PRESS
2. Verify no EMU fit issues.
3. PURGE vlv → op (up), inform **MCC-H** to begin 12-minute purge clock

When 12-minute purge complete

4. PURGE vlv → cl (dn)
5. O2 ACT → IV
6. Go to {2.515 EMU PREBREATHE WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA).

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OBJECTIVE:

Complete 4-hour in-suit prebreathe, install tools, and make final preparations for Crewlock depressurization.

1. **MCC-H** will monitor prebreathe clock.

Protocol	Prebreathe Duration
In-suit	04:00

- EV1,2 2. sw REBA → ON (pull tab toward right arm of suit)

3. **DONNING SAFER (15 MINUTES)**

When comm permits, **MCC-H** will read the remaining steps of this procedure to the EV crew.

- EV1 EV2s SAFER 3.1 PLSS →|← thruster towers

- 3.2 Push latch in and ↻ (~90°)

```
*****
* If latch will not engage
* | Latch → PRELOAD
* | Latch ↻
* | Latch → ENGAGE
* | Return to step 3.1
*****
```

- 3.3 Latch → PRELOAD

- 3.4 Latch ↻ until ratcheting

CAUTION
Latch ↻ may disengage SAFER.

- 3.5 Continue ratcheting until lock marking on latch and tower aligned.

- 3.6 Latch → LCK

- 3.7 ✓Access to HCM deploy lever
 ✓TMG not blocking thruster

- EV2 3.8 Repeat steps 3.1 to 3.7 for EV1s SAFER.

- EV1,2 4. Install miniworkstation, tools, waist tethers, BRTs as required on EMUs.

2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 2 of 4 pages

EV2 Do not proceed until **MCC-H** reports 1 hour of prebreathe remains.
5. Unstow new Metox canister.

EV1s
PLSS 6. Unzip thermal cover.
Affix thermal cover with Velcro to top of EMU.

WARNING

Fan will be off during changeout. Perform changeout as quickly as possible to avoid CO2 buildup.

CAUTION

Vent loop is pressurized. Restrain Metox canister.

EV1 DCM 7. $\sqrt{O_2}$ ACT – IV
8. Helmet purge vlv → op
9. sw FAN → OFF

EV2 EV1s
PLSS 10. Remove expended Metox canister.
11. Remove caps from new Metox canister.
12. Install Metox using label on canister for proper orientation.
Latch canister in place.

NOTE

EMU may issue **CO2 HIGH** or **MONITOR CO2** message because Metox canister not conditioned yet.

EV1 DCM 13. sw FAN → ON
14. Helmet purge vlv → cl, locked

DCM 15. O2 ACT → PRESS
16. PURGE vlv → op (up)
17. Begin timing 2-minute purge.

EV2 EV1s
PLSS 18. Close thermal cover zipper.
19. Place caps on expended Metox.
Temporarily stow canister.
20. Report Metox canister barcodes and new stowage location to **MCC-H** as comm permits.

2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 3 of 4 pages

- EV1 DCM
- When purge time = 2 minutes
21. √STATUS: CO2 < 3.0 mmHg, then:
- PURGE vlv → cl (dn)
22. O2 ACT → IV

NOTE

A minimum of 40 minutes of prebreathe is required to condition Metox canisters.

- EV1,2 23. Repeat steps 5 to 22 for EV2.

- EV1,2 24. pb EMU TV power → Press

√Green LED – On

- MCC-H PCS** 25. CONFIGURING THE DEPRESS PUMP

Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01

RPCM AL1A4A A RPC 01

√Close Cmd – Ena

cmd RPC Position – Close (Verify – CI)

26. OPENING NODE 1 STBD FWD IMV VALVE

Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

sel RPCM N14B A RPC 16

cmd RPC Position – Close (Verify – CI)

‘Enable’

cmd Arm (√Status – Armed)

cmd Enable (√Status – Enabled)

‘Open’

cmd Arm (√Status – Armed)

cmd Open (Wait 15 seconds, √Position – Open)

- EV1,2
Node 1
Stbd Hatch 27. √Ribbed side (EVA side) Hatch Handle in properly stowed position
(Handle should be engaged on Handle Stowage Retaining Key,
pointing up towards UNLATCH direction.)

28. √Latch Ratchet – LATCH

2.515 EMU PREBREATHE WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN/HC) Page 4 of 4 pages

29. ✓Node 1 Stbd Hatch MPEV – CLOSED (✓cap remains removed)

30. Close Node 1 Stbd Hatch per decal.

Eq-Lk 31. ✓IV Hatch equalization valve – OFF (✓cap remains removed)

32. EMERGENCY MPEV → OPEN

33. Ingress C-Lk.

C-Lk 34. ✓DEPRESS PUMP MAN ISOV – CLOSED

CAUTION

Hatch mechanism is a pinch point. Keep all suit components clear of mechanism.

35. IV Hatch → CLOSE, lock

When in-suit prebreathe time complete

UIA

36. ✓sw DEPRESS PUMP PWR – OFF
✓DEPRESS PUMP ENABLE LED – On

On MCC-H GO, go {CREWLOCK DEPRESS/REPRESS
WITHOUT IV CUE CARD} CREWLOCK DEPRESS (SODF:
ISS EVA SYS: NO IV EVA).

HOOK
VELCROHOOK
VELCRO**CREWLOCK DEPRESS/REPRESS WITHOUT IV CUE CARD**

(ISS EVA SYS/E6 - ALL/FIN)

Page 1 of 2 pages

CREWLOCK DEPRESS (30 MINUTES)

- When prebreathe complete
- | | |
|--------------|---|
| DCM | 1. √sw Comm FREQ – LOW |
| | 2. √sw COMM mode → PRI |
| UIA | 3. sw DEPRESS PUMP PWR → ON
(wait 10 seconds for complete startup) |
| C-Lk | 4. DEPRESS PUMP MAN ISOV → OPEN, (expect alert tone)
Monitor Suit P gauge < 5.5. |
| | ***** |
| | * If gauge > 5.5 |
| | * Stop depress, √ MCC-H |
| | ***** |
| DCM | 5. C-Lk at 6.0, (expect alert tone) |
| | When C-Lk at 5.0 psia (259 mmHg) |
| C-Lk | 6. DEPRESS PUMP MAN ISOV → CLOSED, (expect alert tone) |
| DCM | 7. sw DISP → STATUS until LEAK CHECK? displayed
sw DISP → YES, follow displayed instructions |
| | ***** |
| | * If LEAKAGE HI SUIT P X.X |
| | * Perform {2.110 FAILED LEAK CHECK (5 PSIA) } |
| | * (SODF: ISS EVA SYS: EMU CONTINGENCY), then: |
| | ***** |
| | 8. √O2 ACT – EVA |
| | 9. √STATUS, compare with Cuff Checklist page 1 |
| | 10. DEPRESS PUMP MAN ISOV → OPEN, (expect alert tone)
Monitor SUIT P gauge < 5.5. |
| MCC-H | 11. Airlock: ECLSS: PCA: VRIV
'Open'
cmd Arm (√Status – Armed)
cmd Open (√Position – Open) |
| | ***** |
| | * If gauge > 5.5 |
| | * DEPRESS PUMP MAN ISOV → CLOSED |
| | * ↓ MCC-H : 'Stop depress' |
| | * MCC-H perform step 16. |
| | ***** |
| | When C-Lk at 2.0 psia (103 mmHg) |
| C-Lk | 12. DEPRESS PUMP MAN ISOV → CLOSED |
| UIA | 13. sw DEPRESS PUMP PWR → OFF |
| C-Lk | 14. Attach waist tethers to C-Lk D-ring for egress. |
| DCM | When C-Lk dP/dT ~ 0, expect alert tone |
| | When EV Hatch ΔP < 0.5 psi (26 mmHg) |
| C-Lk | 15. EV Hatch → open, stow |
| MCC-H | 16. Airlock: ECLSS: PCA: VRIV
'Close'
cmd Close (√Position – Closed) |

POST DEPRESS (5 MINUTES)

- | | |
|------|---|
| DCM | 1. sw POWER → BATT (stagger switch throws), expect warning tone
(MCC-H record GMT ____/____:____) EVA PET = 00:00 |
| UIA | 2. sw PWR EV-1,2 (two) → OFF
√PWR EV-1,2 LEDs (four) – Off |
| DCM | 3. SCU ← → DCM |
| | 4. Install DCM cover. |
| | 5. Stow SCU in pouch. |
| C-Lk | 6. √DEPRESS PUMP MAN ISOV – CLOSED |
| DCM | 7. Temp control vlv → Max H |
| | 8. sw WATER → ON |
| | 9. √DCM blank, BITE – off |
| | 10. Temp control vlv → 3 to Max C |
| | 11. √STATUS, compare to Cuff Checklist page 1 (MCC-H record) |
| | 12. Visors as required. |
| | 13. Go to { CREWLOCK EGRESS } (SODF: ISS EVA SYS: CUFF
CHECKLIST) page 34 or EVA specific timeline. |

EVA-1a/E6 - ALL/B

HOOK
VELCRO

HOOK
VELCRO

CREWLOCK DEPRESS/REPRESS WITHOUT IV
(ISS EVA SYS/E6 - ALL/FIN) Page 2 of 2 pages

PRE REPRESS (5 MINUTES)

- 1. √SCU →|← DCM
- DCM 2. √sw WATER – OFF (for at least 2 minutes before proceeding)
- 3. √EV Hatch closed, locked
- 4. Waist tethers ←|→ C-Lk D-ring, attach to EMUs
- UIA 5. √OXYGEN EMU1,2 vlv (two) – OPEN
- 6. sw PWR EV-1,2 (two) → ON
- √PWR EV-1,2 EMU LEDs (two) – On
- √PWR EV-1,2 VOLTS = 18.0 to 19.0
- DCM 7. sw POWER → SCU, (expect warning tone)

CREWLOCK REPRESS (10 MINUTES)

WARNING

If on SOP, leave O2 ACT – EVA thru C-Lk repress.

- DCM 1. O2 ACT → PRESS
- 2. sw COMM mode → HL
- C-Lk 3. √EV Hatch MPEV – CLOSED
- 4. IV Hatch equalization valve → throttle OFF to NORM (as required),
(expect alert tone)
(MCC-H record GMT_____/_____:_____)
- DCM 5. C-Lk at 4.0, (expect alert tone)
- When C-Lk at 5.0 (259 mmHg)
- C-Lk 6. IV Hatch equalization valve → OFF, (expect alert tone)
Wait 2 minutes for C-Lk pressure to stabilize, then:
- MCC-H 7. Airlock: ECLSS
Record Crew Lock Press: _____mmHg (P1)
Wait 1 minute, then record again: _____mmHg (P2)

* If $\Delta P \geq 9$ mmHg (where $\Delta P = P1-P2$)
* | Go to {2.530 CREWLOCK LARGE LEAK
* | RESPONSE WITHOUT IV} (SODF: ISS EVA
* | SYS: NO IV EVA).
*
* If $\Delta P > 2$ mmHg (where $\Delta P = P1-P2$)
* | Go to {2.525 CREWLOCK SMALL LEAK
* | RESPONSE WITHOUT IV} (SODF: ISS EVA
* | SYS: NO IV EVA).

- 8. √Gloves heaters – OFF, gloves clean

WARNING

1. If CUFF 1 symptoms resolving upon repress, report as CUFF 2.

2. If any DCS, leave O2 ACT – PRESS.

- DCM 9. O2 ACT → IV
- C-Lk 10. IV Hatch equalization vlv → throttle OFF to NORM, (expect alert tone)
- DCM When C-Lk dP/dT ~ 0, (expect alert tone)
- 11. Go to {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA).

2.520 POST EVA WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 1 of 6 pages

I

(80 Minutes)

OBJECTIVE:

Doff EMUs after an EVA and perform required maintenance activities.

CAUTION

Hatch mechanism is a pinch point. Keep all suit components clear of mechanism.

When equalization is complete

1. Open IV Hatch.

IV Hatch equalization valve → OFF

* If required, use towel to clean gloves.

DOFFING SAFER (5 MINUTES)

EV1 EV2s
SAFER

- ☐☐☐☐ 2. Latch → ENG

- ☐☐☐☐ 3. Latch ↶ until release (~90 deg).

- ☐☐☐☐ 4. PLSS ←|→ Thruster Towers

- ☐☐☐☐ 5. Temporarily stow SAFER in C-Lk.

- EV2 ☐☐☐☐ 6. Repeat steps 2 to 5 for the EV1s SAFER.

DOFFING SUIT (25 MINUTES)

- EV1,2 ☐☐☐☐ 7. pb EMU TV power → OFF

√EMU TV POWER LED (green) – Off

- PLSS ☐☐☐☐ 8. sw REBA → OFF (toward left arm of suit)

- ☐☐☐☐ 9. Remove tools, as required.

WARNING

Do not doff EMU if DCS symptoms resolved during REPRESS. √MCC-H via PMC

- DCM ☐☐☐☐ 10. O2 ACT → OFF

- ☐☐☐☐ 11. PURGE vlv → op (up)

- DCM ☐☐☐☐ 12. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

2.520 POST EVA WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 2 of 6 pages

- EV1,2 ☐☐☐☐ 13. Lower Arm Cables ←|→ Gloves
- Stow lower arm and glove cable connectors under TMG.
Stow gloves in EMU Equipment Bag.
- ☐☐☐☐ 14. Install WATER switch guard.
- ☐☐☐☐ 15. EMU TV Power Cable ←|→ EMU TV
EMU TV Power Cable →|← Ground Plug
- ☐☐☐☐ 16. Helmet ←|→ EMU
- Temporarily stow helmet.
- ☐☐☐☐ 17. Doff comm cap.
Doff EV glasses.
- DCM ☐☐☐☐ 18. sw FAN → OFF
- EV2 ☐☐☐☐ 19. Engage EMU in EDDA.
- ☐☐☐☐ 20. Waist Ring ←|→ HUT
- ☐☐☐☐ 21. LCVG ←|→ Multiple Water Connector
- ☐☐☐☐ 22. Biomed Pigtail ←|→ Electrical Harness
- ☐☐☐☐ 23. √Wrist disconnects – op
- ☐☐☐☐ 24. Doff HUT.
- ☐☐☐☐ 25. Doff LTA.
Temporarily stow LTA.
- ☐☐☐☐ 26. Node 1 Stbd Hatch MPEV → OPEN
- ☐☐☐☐ 27. Open Node 1 Stbd Hatch per decal.
- ☐☐☐☐ 28. Repeat steps 19 to 25 for EV1.
- EV1,2 ☐☐☐☐ 29. Doff biomed, LCVG, TCUs.
- ☐☐☐☐ 30. Doff MAG.
Seal MAG in Ziplock Bag and dispose.
- ☐☐☐☐ 31. Remove dosimeter from LCVG.
- ☐☐☐☐ 32. Biomed Pigtail ←|→ Signal Conditioner
- Stow biomed pigtail in EMU Servicing Kit.

2.520 POST EVA WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 3 of 6 pages

ATU 4,5 ☐☐☐☐ 33. pb HANG UP → Press
pb 1(2,3,4,5) → Press

EACP ☐☐☐☐ 34. sw PWR → OFF

A/L1A ☐☐☐☐ 35. Rotate Flexible Ventilation Duct into C-Lk.
Secure duct with Velcro strap.

PLSS ☐☐☐☐ 36. Remove Metox from EMUs, install caps.
Install EMU Vent Port Plugs on CCC ports.

☐☐☐☐ 37. √PLSS thermal cover on back of EMU – closed

WATER RECHARGE (15 MINUTES)

If EMU Water Recharge required per timeline

☐☐☐☐ 38. Perform {1.505 EMU WATER RECHARGE},
Initiate steps (SODF: ISS EVA SYS: EMU
MAINTENANCE), then:

VERIFYING OXYGEN RECHARGE (5 MINUTES)

DCM ☐☐☐☐ 39. √STATUS:

☐☐☐☐ 40. Continue charge until O2 P > 850 psi.
Record O2 P.
Report to **MCC-H** as comm permits.

EMU	O2 P

UIA ☐☐☐☐ 41. OXYGEN EMU 1,2 vlv (two) → CLOSE

PCS ☐☐☐☐ 42. RECONFIGURING O2 SYSTEM
Airlock: ECLSS: O2 Hi Pressure Supply Valve

cmd Close (√Actual Position – Closed)

C&W Summ

'Event Code Tools'

sel Inhibit

input Event Code – 6 6 0 3 (O2 UIA Supply Pressure
Low-A/L)

2.520 POST EVA WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 4 of 6 pages

cmd Arm
cmd Execute

STOWING SAFER (5 MINUTES)

SAFER ☐☐☐☐ 43. Install Inhibitor (not required if SAFER has been used).

☐☐☐☐ 44. Latch → PRELOAD

☐☐☐☐ 45. Latch ↻ until lock markings on latch and tower recess aligned.

☐☐☐☐ 46. Push in latch.

Latch → LCK

☐☐☐☐ 47. Fold thruster towers, install stowage straps (two).

☐☐☐☐ 48. MAN ISOL vlv → CL (up)

☐☐☐☐ 49. Stow SAFER in SAFER stowage bag in C-Lk.

WATER RECHARGE TERM (5 MINUTES)

If EMU Water Recharge required per timeline

☐☐☐☐ 50. Perform {1.505 EMU WATER RECHARGE},
Terminate steps (SODF: ISS EVA SYS: EMU
MAINTENANCE), then:

☐☐☐☐ 51. POWERING DOWN EMUs

NOTE

When performing EMU powerdown, SCUs may remain connected to the EMUs if additional EMU operations are planned.

UIA

51.1 sw PWR EV-1,2 (two) – OFF

√PWR EV-1,2 LEDs (four) – Off

√PWR EV-1,2 VOLTS: ~ 00.0

51.2 √OXYGEN EMU 1,2 vlv (two) – CLOSE

PSA

51.3 sw SUIT SELECT (two) → OFF

√SUIT SELECT LEDs (four) – Off

51.4 sw MAIN POWER → OFF

√MAIN POWER LED – Off

DCM

51.5 SCU ←|→ DCM

2.520 POST EVA WITHOUT IV

(ISS EVA SYS/E6 - ALL/FIN 1) Page 5 of 6 pages

51.6 Install DCM cover.

C-Lk wall

51.7 Insert SCU in stowage pouch.

SUIT DRYING/SEAL WIPE (10 MINUTES)

☐☐☐☐ 52. Wipe with drying towel
LTA, legs, boots, HUT, suit arms, Gloves

☐☐☐☐ 53. Don safety glasses.

WARNING

Wash hands thoroughly after stericide application.

☐☐☐☐ 54. Wipe LTA crotch with stericide (in EMU Servicing Kit).

☐☐☐☐ 55. Doff safety glasses.

☐☐☐☐ 56. Lightly wipe seals on LTA waist ring, arm wrist rings,
HUT neck ring, helmet interior with lint-free wipe (in
EMU Servicing Kit).

☐☐☐☐ 57. Install Multiple Water Connector cover.

☐☐☐☐ 58. Clean, refurbish biomed.

☐☐☐☐ 59. Remove drink bags from EMU.
Dispose in shuttle wet trash (if available).

✓ Drink bag restraint bag installed in HUT

☐☐☐☐ 60. Clean PHA Quick Don Masks with dry wipes from EMU
Servicing Kit.

STOWING EMU OVERNIGHT (10 MINUTES)

☐☐☐☐ 61. Stow comm cap in right arm of EMU.

☐☐☐☐ 62. Helmet →|← HUT
Install helmet cover.

☐☐☐☐ 63. Tether LTA to EDDA.

☐☐☐☐ 64. Hang LCVGs, TCUs, other EMU accessories for drying.

Node 1 ☐☐☐☐ 65. Node 1 Aft Hatch MPEV → OPEN

☐☐☐☐ 66. Open Node 1 Aft Hatch per decal.

☐☐☐☐ 67. Node 1 Fwd Hatch MPEV → OPEN

2.520 POST EVA WITHOUT IV

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☐☐☐☐ 68. Open Node 1 Fwd Hatch per decal.

LAB ☐☐☐☐ 69. Lab Aft Hatch MPEV → OPEN

☐☐☐☐ 70. Open Lab Aft Hatch per decal.

MCC-H

PCS

71. CONFIGURING AIRLOCK CCAA

Airlock: ECLSS: AL1A1 CCAA: CCAA Commands

AL CCAA Commands

'Temperature'

input Temperature Setpoint – 2 5 deg C

cmd Set

√Command Status – Temperature Setpoint Complete

72. CLOSE NODE STBD FWD AND AFT STBD IMV VALVES

Go to {2.506 IMV VALVE RECONFIGURATION POST CCS}, step 3 (SODF: ECLSS: NOMINAL: THC).

2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/HC/PAPER ON ISS) Page 1 of 5 pages

(90 Minutes with Hatch inspection)
(65 Minutes without Hatch inspection)

OBJECTIVE:

This procedure provides the crew with the necessary steps to safe the Airlock in the event that the Crewlock fails its 5 psi leak check upon Repress. A small leak is defined as one which can be supported by consumables to allow for EV crew to ingress the Equipment Lock and perform safing activities at a habitable pressure. This procedure assumes two EVA crewmembers and no IV crew.

CONFIGURING EMU

EV DCM 1. √sw Comm FREQ – LOW

sw COMM mode → PRI

NOTE

Steps 3 to 13 depress the Crewlock to vacuum and have the EV crew reopen the EV Hatch to check if there is debris that was caught in the hatch when it was closed. Steps 3 to 13 can be performed only if Time and Consumables permit.

MCC-H 2. Inform EV crew whether or not consumables permit performing steps 3 to 13.

DEPRESS CREWLOCK AND INSPECT EV HATCH SEALS (25 MINUTES)

EV DCM 3. √SCU →|← DCM

4. √STATUS: SUIT P 4.2 to 4.4, compare with gauge

5. O2 ACT → EVA (expect SET O2 PRESS msg, sw DISP → PRO)

MCC-H 6. Airlock: ECLSS: PCA: VRCV
PCS AL PCA VRCV

√Status – Operational

√Position – Closed

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open (√Position – Open)

EV DCM 7. Monitor Suit P gauge < 5.5.

* If Suit P gauge ≥ 5.5 psid

* | Stop depress.

* | Contact **MCC-H**.

2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/HC/PAPER ON ISS)

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8. ACTIVATING DEPRESS PUMP

MCC-H
PCS

8.1 Airlock: ECLSS: Depress Pump: RPCM AL1A4A A RPC 01
RPCM AL1A4A A RPC 01

√Close Cmd – Ena

cmd RPC Position – Close (√Position – Cl)

EV UIA

8.2 √DEPRESS PUMP ENABLE LED – On

sw DEPRESS PUMP PWR → ON
(wait 10 seconds for startup)

C-lk

8.3 DEPRESS PUMP MAN ISOV → OPEN

When C-Lk at 2.0 psia (103 mmHg)

9. DEPRESS PUMP MAN ISOV → CLOSED

UIA

10. sw DEPRESS PUMP PWR → OFF

DCM

11. When C-Lk dP/dT ~0, EV expect alert tone

When EV Hatch $\Delta P < 0.5$ psi (26 mm Hg)

EV C-Lk

12. EV Hatch → open

Inspect EV Hatch seals and remove any debris that is present.

MCC-H
PCS

13. Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Close'

cmd Close (√Position – Closed)

REPRESSING CREWLOCK (10 MINUTES)

EV C-Lk

14. √Thermal cover – closed

√EV Hatch MPEV – CLOSED

EV Hatch → close, lock

DCM

15. O2 ACT → PRESS

C-Lk

16. IV Hatch equalization valve → throttle OFF to NORM (as required, expect alert tone)

DCM

17. C-Lk at 4.0, expect alert tone.

When C-Lk at 5.0 (259 mm Hg)

C-Lk

18. IV Hatch equalization valve → OFF (expect alert tone)

2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV

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Wait 30 seconds for pressure stabilization, then proceed
19. \checkmark C-Lk pressure integrity (2 minutes, $\Delta P \leq 0.1$ psi)

If leak check passed

20. Go to CREWLOCK REPRESS {CREWLOCK
DEPRESS/REPRESS WITHOUT IV CUECARD}
steps 8 to 11 (SODF: ISS EVA SYS: NO IV EVA).

- C-Lk 21. IV Hatch equalization vlv \rightarrow throttle OFF to NORM (EMER) (as required, EV expect alert tone)

WARNING

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, leave O2 ACT – PRESS.

DCM When C-Lk P > 5.0 psia

22. O2 ACT \rightarrow IV
23. When C-Lk dP/dT ~ 0 , (EV expect alert tone)

CAUTION

Verify EV crew is clear of hatch mechanism.

DOFFING EMU AND POWERDOWN (25 MINUTES)

- EV 24. To doff EMUs, perform {2.520 POST EVA WITHOUT IV} steps 1 to 25 and 28 (SODF: ISS EVA SYS: NO IV EVA), then:

- UIA 25. sw PWR EV-1,2 (two) \rightarrow OFF

\checkmark PWR EV-1,2 LEDs (four) – Off

- PSA 26. sw SUIT SELECT (two) \rightarrow OFF

\checkmark SUIT SELECT LEDs (four) – Off

27. sw MAIN POWER \rightarrow OFF

\checkmark MAIN POWER LED – Off

- EACP 28. sw PWR \rightarrow OFF

- DCM 29. SCU \leftarrow | \rightarrow DCM

Install DCM Cover.

30. Insert SCU in stowage pouch.

2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/HC/PAPER ON ISS)

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REMOVING SCU AND TOOLS FROM CREWLOCK (30 MINUTES)

- C-Lk 31. Unstow from C-Lk IV Bag:
7/16" Socket with 6" extension (in socket caddy)
EVA Ratchet
- UIA 32. ✓WATER SUPPLY EV-1, 2 vlv (two) – CLOSE
✓WATER REGULATOR EV-1,2 vlv (two) – CLOSE
✓OSCA – O2 CLOSED (O2 3AKP)
- MCC-H/EV
PCS 33. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE
Airlock: ECLSS: O2 Hi Pressure Supply Valve
AL O2 Hi Pressure Supply Valve

cmd Close (Verify Actual Position – Closed)

NOTE

Removal of ОРЛАН caps is technique sensitive.
For removal instructions, push cap inward and
rotate clockwise (opposite the displayed arrow), 1/8
turn; then pull outward.
Refer to Figure 1.



Figure 1.- OSCA and ОРЛАН Caps.

- EV UIA 34. ОРЛАН-I (II) cap 2 ←|→ OSCA
ОРЛАН-I (II) cap 3 ←|→ OSCA
OSCA ↻ PRESS (НАДДУВ)

2.525 CREWLOCK SMALL LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/HC/PAPER ON ISS) Page 5 of 5 pages

35. √OXYGEN EMU 1, 2 vlv (two) – OPEN

NOTE

The next step will depressurize the SCU and UIA supply lines via the OSCA prior to removal of the SCU.

36. OXYGEN ORLAN vlv → OPEN

When purge no longer audible

37. √EMU O2 SUPPLY PRESS gauge \cong 0
√ORLAN O2 SUPPLY PRESS gauge \cong 0

38. OSCA ↺ O2 CLOSED (O2 3AKP)

ОРЛАН-I (II) cap 2 → | ← OSCA
ОРЛАН-I (II) cap 3 → | ← OSCA

39. OXYGEN EMU 1,2 vlv (two) → CLOSE

55. OXYGEN ORLAN vlv → CLOSE

C-Lk

40. Remove SCU from stowage straps on C-Lk wall.

UIA

41. SCU ← | → UIA (by turning SCU Mating bolts (two) ↺ using ratchet with 7/16" Socket (\cong 15 turns each)).

42. Strain relief hooks (two) ← | → tether points (two) on C-Lk wall

43. √DEPRESS PUMP MAN ISOV – CLOSED

44. Remove stowage pouches from C-Lk restraint straps (leave DCM connectors inside pouches).

45. Transfer to E-Lk from C-Lk
SCUs (with pouches)
Crewlock EVA Bags (four)
IV Bag
Staging Bag
All additional EVA tools

E-Lk

46. Close IV Hatch per decal.

√IV Hatch equalization valve – OFF

47. Install IV Hatch equalization valve cap.

48. Perform {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA), then:

√MCC-H for deltas

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2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

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I

(105 Minutes without second repress attempt)

OBJECTIVE:

Given a large Crewlock leak that cannot be supported during Crewlock repress, this procedure depresses the Equipment Lock to vacuum for EV crew ingress and repress.

NOTE

1. No IV crew is available for this procedure.
2. The VRIV and VRCV are assumed to be fully operational.

DEPRESSING CREWLOCK (25 MINUTES)

- | | | |
|--------------|------|--|
| EV | DCM | 1. √sw Comm FREQ – LOW |
| | | 2. sw COMM mode → PRI |
| | C-Lk | 3. √IV Hatch equalization valve – OFF |
| | DCM | 4. O2 ACT → EVA |
| MCC-H | PCS | 5. Airlock: ECLSS: PCA: VRCV
<u>AL PCA VRCV</u>

√Status – Operational
√Position – Closed

Airlock: ECLSS: PCA: VRIV
<u>AL PCA VRIV</u>
'Open'

cmd Arm (√Status – Armed)
cmd Open (√Position – Open) |
| EV | DCM | 6. Monitor SUIT P gauge < 5.5.

* If gauge > 5.5, stop depress, √ MCC-H .
***** |
| EV | C-Lk | If EV Hatch MPEV is usable per MCC-H
7. EV Hatch MPEV → OPEN

8. Attach waist tethers to C-Lk (UIA) D-ring.

9. When C-Lk dP/dT ~ 0, (EV expect alert tone) |

2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/PAPER ON ISS) Page 2 of 6 pages

When EV Hatch $\Delta P < 26$ mmHg (0.5 psi)

- 10. EV Hatch → open, stow
- 11. EV Hatch MPEV → CLOSED

12. Inspect EV Hatch seals for damage and debris.

13. Remove debris as required.

MCC-H

14. ✓ EMU consumables

EV

If second repress attempt desired and > 90 minutes of EMU consumables remain

- 15. ✓ Thermal cover – closed
- 16. EV Hatch → close and lock
- 17. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS WITHOUT IV CUE CARD} (SODF: ISS EVA SYS: NO IV EVA) steps 3 - 11.

If < 80 minutes of EMU Metox (LiOH) remain

- 18. Helmet Purge vlv → open

PREPARING EQUIPMENT LOCK FOR VACUUM (20 MINUTES)

MCC-H	EV
19. Perform {2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV} steps 1 to 6 (SODF: ISS EVA SYS: NO IV EVA), then:	C-Lk 20. Begin removing every other Velcro strap from SCU. C-Lk IVA Bag: 21. Retrieve EVA Ratchet and 7/16" X 6" wobble socket. DCM 22. Cold soak as time allows. Temp control vlv → increase toward Max C (slightly colder than comfortable)

EQUIPMENT LOCK DEPRESS (15 MINUTES)

MCC-H

23. Give a go for Equipment Lock depress.

EV

C-Lk

24. ✓ EV Hatch – open and stowed

25. IV Hatch equalization valve → EMER

2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/PAPER ON ISS)

Page 3 of 6 pages

MCC-H
PCS

26. Airlock: ECLSS: PCA: VRCV
AL PCA VRCV
'Open'

cmd Arm (√Status – Armed)

cmd Open (√Position – Open)

WARNING

Hatch latch mechanism is a pinch hazard.
Verify EV crew is clear of it.

When E-Lk pressure ~ 0.0 psia (expect ~ 10 to 15 minutes)

MCC-H

27. Give EV crew a go to open IV Hatch

EV C-Lk

28. Open IV Hatch per decal.
29. IV Hatch equalization valve → OFF
30. EV Hatch Thermal Cover → Close
31. Partially close EV Hatch. Leave small gap for water sublimation.
32. Waist Tethers ←|→ C-Lk D-ring; attach to EMUs

CONFIGURING FOR SCU REMOVAL (5 MINUTES)

33. Transfer the following to Equipment Lock and secure:
- IV Bag
 - Staging Bag
 - Crewlock EVA Bags (four)
 - All ORUs

If Helmet Purge vlv open (per step 18, to conserve Metox/LiOH)

34. Helmet Purge vlv → close and lock

- DCM 35. √STATUS: O2 P > 850

WARNING

EV crew will be without SCU O2 supply for approximately 45 minutes. If Metox (LiOH) canister expended, open/close helmet purge valve as required to maintain safe ppCO2 levels. The SOP may be required to complete the procedure.

2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/PAPER ON ISS) Page 4 of 6 pages

MCC-H

PCS

36. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE

Airlock: ECLSS: O2 Hi Pressure Supply Valve

AL O2 Hi Pressure Supply Valve

cmd Close (Verify Actual Position – Closed)

EV

DCM

37. sw POWER → BATT, (expect warning tone)

UIA

38. sw PWR EV-1,2 (two) → OFF

√PWR EV-1,2 LEDs (four) – Off

DCM

39. SCU ←|→ DCM

Install DCM cover.

C-lk

40. Stow SCU in pouch.

DCM

41. Temp control vlv → Max H

42. sw WATER → ON

43. √DCM blank, BITE – off

44. Temp control vlv → between 3 and Max C (slightly colder than comfortable)

MCC-H

PCS

45. DISABLING THE POWER SUPPLY ASSEMBLY

Airlock: EPS: RPCM AL2A3B B

sel RPC 18

RPCM AL2A3B B RPC 18

cmd Open Cmd – Enable (√Open Cmd – Ena)

cmd RPC Position – Op (√RPC Position – Op)

MCC-H

46. Give EV crew a go for SCU removal.

REMOVING SCU FROM UIA (20 MINUTES)

MCC-H	EV
47. Perform {2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV} steps 7 and 8 (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY), then:	<div>CAUTION</div> <p>ОПЛАН caps on UIA are not tethered. Be prepared to catch them during removal.</p> <p>48. Perform {SCU REMOVAL FROM UIA (AT VACUUM)} pages 32 and 33 (SODF: ISS EVA SYS: CUFF CHECKLIST), then:</p>

2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/PAPER ON ISS) Page 5 of 6 pages

EQUIPMENT LOCK INGRESS (5 MINUTES)

EV DCM 49. Begin maximum cold soak.

Temp control vlv → Max C

50. Transfer SCUs to E-Lk and secure.

51. √All items removed from C-Lk.

NOTE

EV crew will be without cooling after the next step.

DCM 52. sw WATER→ OFF

53. EV Hatch → fully close, lock

54. Ingress E-Lk.

55. Close IV Hatch per decal, lock.

√IV Hatch equalization valve – OFF

A/L1A2 56. EMERGENCY MPEV → CLOSED

EQUIPMENT LOCK REPRESS (15 MINUTES)

WARNING

The VRIV and VRCV must be closed in order to repress the Equipment Lock.

NOTE

EV crew disregard SET O2 PRESS message during repress.

MCC-H 57. Give a go for Equipment Lock Repress

EV 58. Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

2.530 CREWLOCK LARGE LEAK RESPONSE WITHOUT IV

(ISS EVA SYS/INC 9 - ALL/FIN 0/PAPER ON ISS) Page 6 of 6 pages

If EV crew consumables/condition permit

MCC-H

59. When E-Lk at 1.0 psi, perform IV Hatch leak check
 - 59.1 Node 1 Stbd Hatch MPEV → CLOSED (EV expect alert tone)
 - 59.2 Wait 30 seconds for pressure stabilization.
 - 59.3 √E-Lk pressure integrity (2 minutes, $\Delta P < 1.5$ mmHg)
 - 59.4 Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

EV

60. E-Lk at 4.0 psi, EV expect alert tone

WARNING

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, O2 ACT → PRESS instead of IV in the next step.

DCM

When E-Lk at 5.0 psi

61. O2 ACT → IV

WARNING

Verify EV crew is clear of hatch latch mechanism.

When E-Lk dP/dT ~0 (EV expect alert tone)

62. Open Node 1 Stbd Hatch per decal.

63. √Node 1 Stbd Hatch MPEV – CLOSED

EV

64. Install IV Hatch equalization valve cap.

MCC-H	EV
65. Go to {4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE} (SODF: ISS EVA SYS: AIRLOCK CONTINGENCY).	66. Perform {2.520 POST EVA WITHOUT IV} (SODF: ISS EVA SYS: NO IV EVA), then: √MCC-H for deltas

(20 minutes)

OBJECTIVE:

Command ISS hardware to a configuration safe for Equipment Lock Depress and Repress. This procedure assumes no IV crew is present.

NOTE

MCC-H will perform steps 1 to 6 just prior to Equipment Lock depress and steps 7 to 8 just prior to Equipment Lock repress.

PRIOR TO EQUIPMENT LOCK DEPRESS**1. CLOSING IMV TO AIRLOCK AND DEACTIVATING CDRA****MCC-H****1.1 Rapid Depress: ISS IMV Isolation****ISS IMV Isolation**

'Airlock IMV Isolation'

cmd Arm (√Arm Status – Armed)**cmd** Isolate

√Status – Isolated

1.2 Node 1: ECLSS: IMV Stbd Aft Vlv**Node 1 IMV Stbd Aft Valve**

'Inhibit'

cmd Arm (√Arm Status – Armed)**cmd** Inhibit (√State – Inhibited)**sel** RPCM N14B C RPC 13**cmd** RPC Position – Open (√Position – Op)**1.3 Node 1: ECLSS: IMV Stbd Fwd Vlv****Node 1 IMV Stbd Fwd Valve**

'Inhibit'

cmd Arm (√Arm Status – Armed)**cmd** Inhibit (√State – Inhibited)**sel** RPCM N14B A RPC 16**cmd** RPC Position – Open (√Position – Op)**1.4 US Lab: ECLSS: AR Rack****LAB AR Rack Overview**

'CDRA'

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 2 of 7 pages

If CDRA State – Operate

NOTE

Per SPN 2625 (5A-AC), the Disarm command should be sent after the Stop command because it does not automatically disarm itself.

'Stop'

cmd Arm (√Status – Armed)

cmd Stop

cmd Disarm (√Status – Disarmed)

√CDRA Status – Stop Complete

2. CONFIGURING IATCS

2.1 US LAB: TCS

LAB:IATCS Overview

'Status'

If Mode – Sngl LT or Sngl MT

Go to step 3.

Perform {2.204 LAB IATCS TRANSITION TO SINGLE LT (AUTO)}, steps 1 to 5.1, 6, and 7 (SODF: TCS: NOMINAL: IATCS), then:

NOTE

LT Setpoint is raised to prevent localized freezing of water on the AL CCAA HX surfaces. While the LT setpoint is elevated, LAB CCAAs are not providing any latent cooling.

2.2 Raising LT Setpoint

P6: TCS: Loop A(B) Details: PPL Ver ID

PPL_Ver_ID

'P6 PVCA EETCS'

'Setpt PPL Ver ID'

√Prime: 106

√Bkup: 106

If Ver ID ≠ 106, √**MCC-H**

P6: TCS: Loop A(B) Line Heater Icon

Loop A(B) Line Heater Commands

'EETCS LoopA(B) PFCS'

√Line Htr Cntl – Ena

If Line Htr Cntl – Inh

√Inhibited Line Htr ≠ Both

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 3 of 7 pages

Repeat Line Htr step for EETCS Loop B.

US LAB: TCS: LTL TWMV icon

LTL TWMV Commands

'LTL TWMV'

cmd CLC – Inh Execute

√CLC – Inh

cmd Posn – Byp Execute

√Posn – Byp

US LAB: TCS: MTL TWMV Icon

MTLTWMV Commands

'MTL TWMV' 'Temp Setpt'

input – 2 1.1

cmd Set Execute

√Temp Setpt – 21.1° C

√CLC – Ena

3. DEACTIVATING AIRLOCK CCAA AND SMOKE DETECTORS

3.1 Fire Summ: Airlock

AL Fire Display

'Fire Isolation'

'Cabin Air Assembly'

cmd Stop (√State – EIB Off)

sel AL CCAA

AL CCAA

sel CCAA Commands

AL CCAA Commands

sel RPCM AL2A3B B RPC [X] where [X] =

3	5	6	17
---	---	---	----

cmd RPC Position – Open (√Position – Op)

Repeat

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 4 of 7 pages

- 3.2 AL Fire Display
'Airlock Smoke Detectors'

sel Cabin

AL Cabin Smoke Detector
'Monitoring'

cmd Inhibit ($\sqrt{\text{Status}} - \text{Inhibited}$)
sel RPCM AL2A3B A RPC 08

RPCM AL2A3B A RPC 08

cmd RPC Position – Open ($\sqrt{\text{Position}} - \text{Op}$)

AL Fire Display
'Airlock Smoke Detectors'

sel Duct

AL Duct Smoke Detector
'Monitoring'

cmd Inhibit ($\sqrt{\text{Status}} - \text{Inhibited}$)
sel RPCM AL2A3B B RPC 07

RPCM AL2A3B B RPC 07

cmd RPC Position – Open ($\sqrt{\text{Position}} - \text{Op}$)

MCC-H 3.3 Configure MCA for Sampling Node/Lab

AL Fire Display
'LAB MCA'

$\sqrt{\text{State}} - \text{Operate}$

If State not Operate
Go to step 4.

sel LAB MCA

LAB MCA

sel Nominal Cmds

LAB MCA Nominal Commands

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 5 of 7 pages

NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

'Standby'

cmd Immediate

√State – Standby

'Auto Sequencing'

cmd LAB/Node1

√State – Operate

LAB MCA

sel Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

4. INHIBITING AIRLOCK C&W EVENTS

4.1 C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 6 8 (Cabin Pressure Low-E/L)

cmd Arm

cmd Execute

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Arm

cmd Execute

input Event Code – 5 9 1 0 (Cabin Pressure Below Normal-E/L)

cmd Arm

cmd Execute

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 6 of 7 pages

5. INHIBITING AIRLOCK RAPID DEPRESS RESPONSE

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

'Inhibit'

cmd Arm Inhibit – Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

'CC MDM Rapid Depress Response'

'Inhibit'

cmd Arm (√Status – Armed)

cmd Inhibit (√Status – Inhibited)

6. DEACTIVATING AIRLOCK C&T, EPS, AND EVAS HARDWARE

6.1 Deactivating ATUs, CVIU, EACP, and UOP

Airlock: EPS: RPCM AL2A3B A

sel RPC [X] where [X] = 1 3 14 17

cmd RPC Position – Open (√Position – Op)

Repeat

Airlock: EPS: RPCM AL2A3B B

sel RPC [X] where [X] = 1 2

cmd RPC Position – Open (√Position – Op)

Repeat

If Metox Regenerator or BCA are powered on

6.2 Deactivating Metox Regenerator and BCA

Airlock: EPS: RPCM AL1A4A B

sel RPC [X] where [X] = 3 4 5 6 17

cmd RPC Position – Open (√Position – Op)

Repeat

PRIOR TO EQUIPMENT LOCK REPRESS

MCC-H
PCS

7. INHIBITING ISS RAPID DEPRESS RESPONSE AND C&W

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

'Inhibit'

2.535 EQUIPMENT LOCK CONFIG FOR VACUUM WITHOUT IV

(ISS EVA SYS/E9 - ALL/FIN 1) Page 7 of 7 pages

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

'CC MDM Low Cabin P Response'

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√Status – Inhibited)

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 5 7 5 (Rapid Depress – LAB)

cmd Arm

cmd Execute

MCC-H

8. CLOSING VRCV AND VRIV

Airlock: ECLSS: PCA: VRCV

AL PCA VRCV

'Close'

cmd Close (√Position – Closed)

Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Close'

cmd Close (√Position – Closed)

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CUFF CHECKLIST

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CUFF CHECKLIST

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NORMAL EVA STATUS

(ISS EVA SYS/7A - ALL/FIN 1)

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NORMAL EVA STATUS

O2 POS	EVA
TIME EV	HH:MM since PWR-BATT
TIME LF/ Limit consum	HH:MM remaining at present use rate
% O2 (PWR) LF	Nonlimiting consumable will be displayed
SUIT P	4.2 to 4.4 psid
O2 P	150 to 950 psia
SOP P	5410 to 6800 psia
SUBLM P	2.0 to 4.2 psia
BAT VDC	≥ 16.7
BAT AMP	3.0 to 4.0
RPM	18.0 to 20.0 K
CO2	0.2 to 2.0 mm
H2O TEMP	32 to 75° F
H2O GP/WP	14.0 to 16.0 psid
GAUGE	4.2 to 4.4 psid

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DCM
CONFIG
MAL
INDEX

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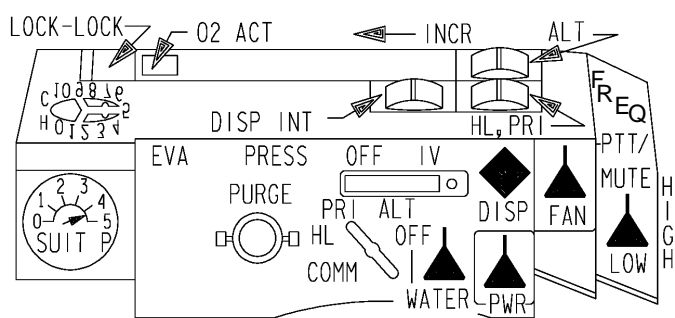
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DCM CONFIG

(ISS EVA SYS/7A - ALL/FIN 1)

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NORM
EVA
STAT



EVA COMM FREQUENCIES

LOW=414.2 MHz

HIGH=417.1 MHz

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EMU MALFUNCTION INDEX

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EMU MALFUNCTION INDEX

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ABORT EVA	6	O2 USE HIGH	14
AIR FLOW CONT	21	PWR LF (%)	24
BATT AMPS HI	9	RESRV H2O ON	17
BATT VDC LOW	10	RLF V FAIL	23
BITE light	23	SET H2O OFF	24
COMM FAIL	20	SET O2 EVA	24
CO2 HIGH	19	SET O2 PRESS	24
DCS	4	SET PWR SCU	24
FAN SW OFF	24	SOP O2 ON	8
H2O GP LOW	16	SOP P LOW	13
H2O IS OFF	24	SUBLM P	15
LIMITS BAD	23	SUIT P EMERG	23
LOSS OF COOLING	22	SUIT P HIGH	12
MONITOR CO2	19	SUIT P LOW	11
NO VENT FLOW	18	TERMINATE EVA	7
O2 IS OFF	24	TIME LF: XX	24
O2 LF (%)	24	VENT SW FAIL	23

DCS

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DECOMPRESSION SICKNESS (DCS)

(ISS EVA SYS/7A - ALL/FIN 1) Page 1 of 2 pages

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DECOMPRESSION SICKNESS (DCS)

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Class 1

Symptoms: Mild pain (single/multiple sites) and/or single extremity numbness/tingling. Difficult to discern from suit pressure points. Symptoms do not interfere with performance.

DCM
CONFIG
MAL
INDEX

DCS Action: Report in POST EVA PMC.

Class 2

Symptoms: Moderate Class 1 symptoms that interfere with performance or symptoms that resolve upon repress.

Action: Perform worksite cleanup, minimize activity of affected crewmember, TERM EVA; REPRESS

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DECOMPRESSION SICKNESS (DCS)

(ISS EVA SYS/7A - ALL/FIN 1) Page 2 of 2 pages

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DECOMPRESSION SICKNESS (DCS) (CONT)

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Class 3

Symptoms: Severe Class 1 symptom or migratory, trunkal/multiple site numbness/tingling, unusual headache.

Action: Assist affected crewmember to C-Lk, safe worksite, TERM EVA; REPRESS.

Class 4

Symptoms: Serious symptom – central neurological, cardiopulmonary

Action: ABORT EVA.
Assisted return of affected crewmember to C-Lk, repress affected crewmember solo. Unaffected crewmember safe worksite, TERM EVA; REPRESS.

ABORT
EVA

TERM
EVA

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ABORT EVA

(ISS EVA SYS/7A - ALL/FIN 1)

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ABORT EVA

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BOTH: Ingress C-Lk.
Unhook from reel.
Outer (EV) Hatch – close and lock
Go to EMERGENCY CREWLOCK REPRESS
decal (airlock hatches).

DCS

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TERMINATE EVA

(ISS EVA SYS/7A - ALL/FIN 1)

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TERMINATE EVA

1. Ingress C-Lk.
2. Connect SCU.

WARNING

If terminating due to BATT AMPS HIGH
(system short), do not perform step 3.

- UIA
3. sw PWR EV-1(2) → ON
 4. √OXYGEN EMU1(2) vlv – OPEN

NOTE

If fan stops during power transfer
Cycle FAN switch – OFF,ON

- DCM
5. PWR → SCU (fwd)
 6. WATER → OFF (fwd)
 7. √SUIT P ≥ 3.3 and stable
 8. Monitor EMU status.
 9. Coordinate Ingress with EV1(2).

SOP
ON

BATT
AMPS

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SOP O2 ON

TIME LF HH'MM

1. Go to ABORT EVA, 6. >>

NOTE

Message triggered when:
SUIT P < 4.05 and
SOP RATE > 36.0 psi/min.

ABORT
EVA

TERM
EVA

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BATT AMPS HIGH

(ISS EVA SYS/7A - ALL/FIN 1)

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BATT AMPS HIGH

BATT AMPS HI	BAT AMPS X.X	BAT VDC XX.X
--------------	--------------	--------------

1. Helmet purge vlv → op

2. sw FAN → OFF

If BAT AMP without fan > 1.3 (system short)

3. sw WATER → OFF

4. Notify IV/EV of impending communication loss.

5. sw POWER → SCU, do not take UIA EV-1(2) PWR → ON

6. Go to TERM EVA, 7.

If BAT AMP without fan 0.7 to 1.3 (fan short)

7. Go to TERM EVA, 7.

NOTE

Message triggered when amps > 5.0.

Normal BATT AMP: 3.0 to 4.0.

Normal BATT AMP without fan: 0.7 to 1.3.

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BATT
VDC
SUIT
P LOW

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BATT VDC LOW	BAT VDC XX.X
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2. Continue EVA.

Normal Fan RPM: 18.0 to 20.0K.

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1. Go to ABORT EVA, 6. >>

2. Continue EVA, monitor SUIT P, SOP P, and gauge.

3. Go to TERM EVA, 7. >>

SUIT
P HI

SOP P
LOW

NOTE
Message triggered when SUIT P < 4.05.

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SUIT P HIGH

SUIT P HIGH	O2 RATE XX.X	SOP RATE XXX
-------------	--------------	--------------

If O2 RATE > 7.0 or SOP RATE > 8
| 1. Go to TERM EVA, 7. >>
If O2 RATE < 7.0 and SOP RATE ≤ 8
| 2. Monitor SUIT P, SOP P, and gauge.
| 3. Continue EVA.

BATT
VDC
SUIT
P LOW

NOTE

Message triggered when SUIT P > 4.55.
Normal O2 RATE ~1.7 psi/min.

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SOP P LOW

(ISS EVA SYS/7A - ALL/FIN 1) Page 1 of 1 page

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SOP P LOW



SOP P LOW	SOP P XXX0	SOP RATE XXX
-----------	------------	--------------

1. Go to TERM EVA, 7. >>

NOTE
Message triggered when SOP P < init SOP P – 600
(SOP P initialized at EMU powerup).

O2
USE

SUBLM
PRESS



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O2 USE HIGH

(ISS EVA SYS/7A - ALL/FIN 2)

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O2 USE HIGH

O2 USE HIGH	O2 RATE XX.X
-------------	--------------

If SUIT P LOW message present

1. Go to ABORT EVA, 6.

If O2 P erratic or ~ 0

2. Continue EVA.
3. Recharge O2 periodically.

If O2 RATE > 7.0

4. Go to TERM EVA, 7.

If O2 RATE ≤ 7.0

5. Recharge O2 as required.
6. Continue EVA.

SUIT
P HI
SOP P
LOW

NOTE

Message triggered when
O2 RATE > 10.2 psi/min or
O2 P < 150 and TIME EV < 5 hr.
Normal O2 RATE ≈ 1.7 psi/min.

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SUBLM PRESS

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 1 page

SUBLM PRESS

SUBLM P XX.X SET H2O OFF

1. √WATER – OFF (fwd)

If SUBLM P < 1.0 and stable

When cooling desired, then:

2. Temp control vlv – Max H

3. WATER – ON (aft)

4. Temp control vlv – as required

If cooling insufficient

5. Go to LOSS OF COOLING, 22, step 2.

If cooling sufficient

6. Continue EVA, monitor SUBLM P and cooling. >>

If SUBLM P ≥ 1.0 and stable (sensor fail)

7. Perform steps 2 to 4, continue EVA, monitor H2O GP/WP and cooling.

NOTE

Message triggered when SUBLM P < 1.5 or > 5.3.
Normal SUBLM P: 2.0 to 4.2.

H2O
GP LO
RESRV
H2O

23 JUN 04

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H2O GP LOW

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

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H2O GP LOW

|

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H2O GP LOW

If H2O WP < 13.5 (H2O reg fail)

| If cooling insufficient

| 1. Go to LOSS OF COOLING, 22.

| If cooling sufficient

| 2. Monitor cooling.

| 3. Continue EVA. >>

If H2O WP ≥ 13.5 (xdcr fail)

| 4. Monitor H2O WP.

| If H2O WP drops to < 12.0

| 5. Go to TERM EVA, 7.

NOTE

Message triggered when H2O GP < 13.5.

Normal H2O TEMP: 32° to 75° F.

Normal H2O WP: 14.0 to 16.0.

O2
USE
SUBLM
PRESS

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RESRV H2O ON

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

RESRV H2O ON

RESRV H2O ON	TIME LF 'MM
--------------	-------------

H2O GP	H2O WP	ACTION
≈15	≈0	1. Monitor SUBLM P and H2O TEMP (WP xdcr fail).
> 17.0	≈15	2. Monitor H2O WP and H2O TEMP (GP xdcr fail). If H2O WP drops to < 12.0 3. Go to TERM EVA, 7.
≈15	< 12.0	4. Go to TERM EVA, 7 (reserve H2O on).

NOTE

Message triggered when GP minus WP > 2.1 psi.
Normal SUBLM P: 2.0 to 4.2 psia.
Normal H2O TEMP: 32° to 75° F.
Normal H2O GP/WP: 14.0 to 16.0.

NO
VENT
CO2

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Page 1 of 1 page

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NO VENT FLOW

If fan is not running

1. Cycle FAN sw → OFF,ON

2. Continue EVA. >>

3. Helmet purge vlv → op

If fan is running

5. Helmet purge vlv → op

If RPM \geq 19.0K

8. Go to CO2 HIGH, 19, step 3.

Message triggered when flow < 3.7 cfm.
Normal vent flow: 6 to 8 cfm.

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CO2

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

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CO2

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CO2 XX.X MM MONITOR CO2 – PPCO2 > 3.0 MM

1. Minimize physical activity.
2. Assess physical condition then go to step 3 below.

CO2 HIGH OPEN PURGE V – PPCO2 > 8.0 MM

1. √DCM PURGE vlv – cl, √Helmet purge vlv – op
If symptoms noted prior to opening purge vlv
2. Go to TERM EVA, 7. >>
- If no symptoms noted (or inconclusive)
3. Close/open helmet purge vlv as required to assess physical condition for high CO2.
If symptoms noted
4. Helmet purge vlv → op
5. Go to TERM EVA, 7. >>
- If no symptoms noted
6. Helmet purge vlv → cl, locked
7. Monitor physical condition and PPCO2.
8. Continue EVA.

COMM
FAIL
AIR
CONTM

NOTE

Normal PPCO2: 0.2 to 2.0 mm

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COMMUNICATION FAILURE

(ISS EVA SYS/7A - ALL/FIN 3)

Page 1 of 1 page

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COMMUNICATION FAILURE

- ALL 1. ✓Proper config, EMU and ISS (Mode, Volume, Freq)
Perform following sequence until communication restored:
- BOTH If EV crewmember hears intermittent sidetones/
communication or no sidetones
2. Clear structure to recover communication (signal
blockage).
- If unresolved
3. Affected crewmember select ALT(PRI)(notify
MCC-H).
- ISS IV If IV does not have communication with EV1 and EV2
- PCS 4. If UHF 1 active
| 4.1 C&T: UHF 1: RPCM LAD52B A RPC 08
If UHF 2 active
| 4.2 C&T: UHF 2: RPCM LA1B H RPC 04
4.3 **cmd** RPC Position – Open (✓Position – Op)
4.4 Contact **MCC-H** for clean up steps
- STS IV If IV does not have communication with EV1 and EV2
- O6 | 5. sw EVA STRING → 2(1).
- ALL If unresolved
6. Perform coordinated frequency change.
If unable to restore minimum of relay communication
7. Go to TERM EVA, 7.

NO
VENT
CO2

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AIR FLOW CONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

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AIR FLOW CONTAMINATION

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If flow exiting helmet vent contaminated by

Caustic water or LiOH particles

1. Helmet purge vlv → op

2. sw FAN → OFF

3. sw WATER → OFF

If contamination still present

4. Go to ABORT EVA, 6.

If contamination no longer present

5. Go to TERM EVA, 7.

If excessive water in vent loop or helmet

6. Contact **MCC-H**.

NOTE

EMU water tanks hold ~ 1 gallon H2O.

LOSS
COOL
MISC 1

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LOSS OF COOLING

(ISS EVA SYS/LF1 - ALL/FIN)

Page 1 of 1 page

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LOSS OF COOLING

1. Temp Control vlv → cycle 3 to Max C; leave in Max C

If cooling restored, continue EVA >>

2. Begin translation to Airlock for TERMINATE EVA.

If SCU cannot be connected prior to overheating

DCM

3. Helmet purge vlv → Open, lock

4. If vent flow excessively hot
sw FAN → OFF

If helmet purge flow insufficient for cooling

5. Helmet purge vlv → Closed, lock

6. DCM purge vlv → Open

7. SCU →|← DCM

8. √sw FAN – ON

COMM UIA 9. √OXYGEN EMU 1(2) vlv – OPEN

FAIL

If cooling sufficient

AIR

10. √Helmet purge vlv – Closed, locked

CNTM

11. √DCM purge vlv – Closed, locked

If cooling insufficient

12. Perform steps 3 to 6

13. Go to TERM EVA, 7

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MISCELLANEOUS MESSAGES

(ISS EVA SYS/7A - ALL/FIN 1) Page 1 of 2 pages

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MISCELLANEOUS MESSAGES 1

SUIT P EMERG CLOSE PURG V – SUIT P < 3.1

RLF V FAIL STOP DEPRESS – Stop DEPRESS,
Contact MCC-H,
SUIT P > 5.7.

VENT SW FAIL – Vent flow sensor unreliable.

Built-In Tests

BITE light illuminated – CWS unreliable, contact MCC-H.

LIMITS BAD – Warnings unreliable, monitor status
list, continue EVA.

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TIME
LF
IV
HATCH

MISCELLANEOUS MESSAGES

(ISS EVA SYS/7A - ALL/FIN 1)

Page 2 of 2 pages

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MISCELLANEOUS (Cont)/TIME LF

SET O2 EVA
SET O2 PRESS
SET H2O OFF
FAN SW OFF
SET PWR SCU
O2 IS OFF
H2O IS OFF

Verify proper configuration.

Consumables

XX% O2 LF	TIME LF 'MM
XX% PWR LF	TIME LF 'MM

Triggered with 30 minutes of
calculated time remaining for
for limiting consumable.

1. Contact **MCC-H** to confirm calculation.

If no communications with **MCC-H**
| Go to TERM EVA, 7.

LOSS
COOL

MISC 1

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IV HATCH LATCH DISCONNECT

(ISS EVA SYS/7A - ALL/FIN 2)

Page 1 of 2 pages

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IV HATCH LATCH DISCONNECT

IV BAG – EVA RATCHET, 1/2" SOCKET 8" EXT

1. Inspect latches for debris/damage.
2. Turn crank handle.

If no rotation:

3. Remove PIP pin from all eight tension rods.
 4. Cycle disengaged latch using tension rod for leverage.
 5. If latch does not cycle, remove latch by releasing four captive latch bolts. Secure latch after removal.
 6. If latch does cycle, cycle latch to open position.
7. Hatch → Open

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EV
HATCH

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IV HATCH LATCH DISCONNECT

(ISS EVA SYS/7A - ALL/FIN 1)

Page 2 of 2 pages

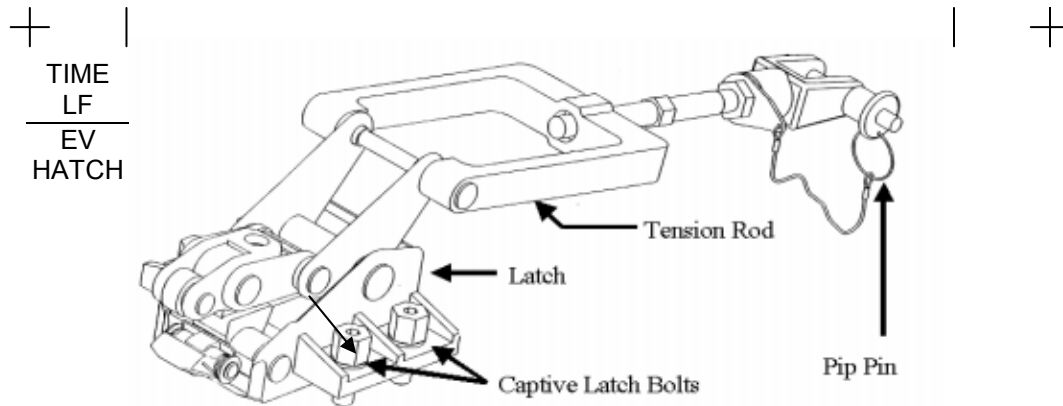


Figure 1.- Tension Rod/Latch Assembly.

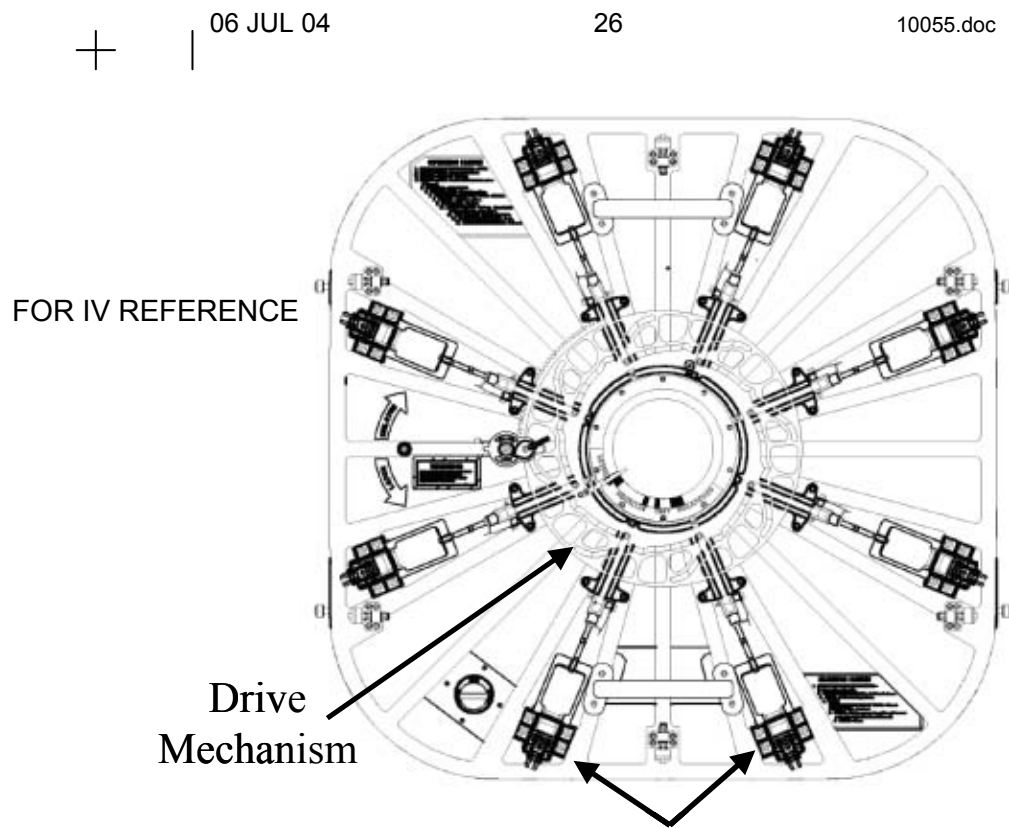


Figure 2.- Tension Rod/Latch Assembly (eight).

EV HATCH LATCH DISCONNECT

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

EV HATCH LATCH DISCONNECT

A/L TOOL BOX – EVA RATCHET, 7/16" SOCKET 6" EXT, ADJ
WRENCH

CETA TOOL BOX – SM TRASH BAG

1. Remove bolt A, stow in trash bag.

2. Rotate actuator handle.

If no rotation – jammed actuator

3. Force latches open.

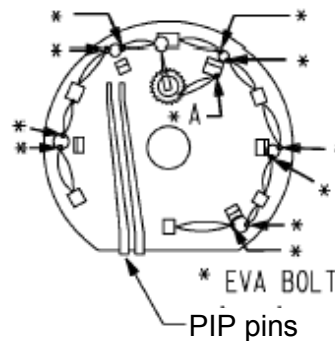
4. Seal hatch with repress and secure.

If free rotation – jammed latch

5. Locate and remove
jam.

6. Reconnect actuator.

EV
HATCH
SSRMS
FRGF



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EV HATCH HINGE DISCONNECT

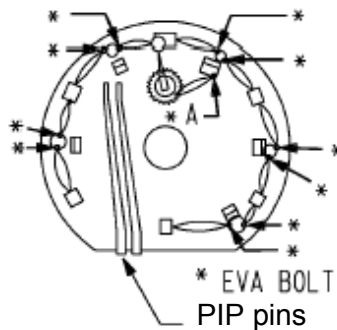
(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

EV HATCH HINGE DISCONNECT

1. Remove hinge PIP pins, as required.
2. Restrain hinge arm(s) and PIP pins clear of opening.
3. Ingress airlock, position hatch for closing.
4. Hatch → close, lock

EV
HATCH
LATCH



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SSRMS FRGF RELEASE

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

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SSRMS FRGF RELEASE

CETA TOOL BOX – EVA RATCHET, 1/2" SOCKET 8" EXT, SM
TRASH BAG

1. White release rod ↻ (32 strokes of 90 degrees).
2. Black release rod ↻ (32 strokes of 90 degrees – shaft will
release from grapple fixture).
3. Clear worksite for SSRMS powerdown.
4. Stow slug in small trash bag.

SSRMS
PDGF
SSRMS
LEE
LATCH

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SSRMS PDGF RELEASE

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

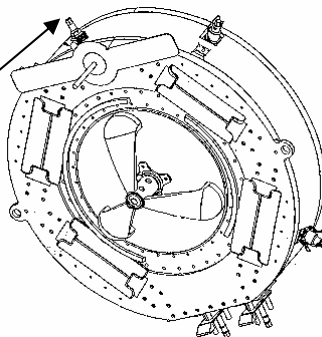
SSRMS PDGF RELEASE

CETA TOOL BOX – EVA RATCHET, 7/16" SOCKET 6" EXT

1. Rotate shaft release mechanism to hard stop (shaft will release from grapple fixture).
2. Clear worksite for SSRMS powerdown.

EV
HATCH
HINGE
SSRMS
FRGF

Shaft release
mechanism



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SSRMS LEE LATCH CONTINGENCY

(ISS EVA SYS/E8 - ALL/FIN) Page 1 of 1 page

SSRMS LEE LATCH CONTINGENCY

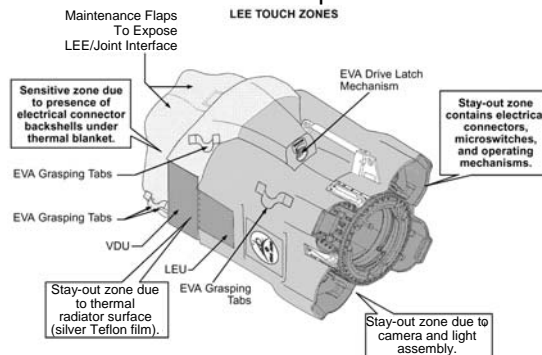
PGT, Right Angle Drive, 7/16" Socket 2" Extension, 6.6 ft-lbs, 30 rpm, 10.5 or

EVA Ratchet, 7/16" Socket 2" Extension

CAUTION

Do not exceed 10.5 ft-lbs against hard stop.

1. To Release LEE Latch
Rotate LEE Latch EVA Drive bolt CCW up to 59.5 turns to hard stop
2. To Engage LEE Latch
Rotate LEE Latch EVA Drive bolt CW up to 59.5 turns to hard stop
3. Clear worksite



SCU
RMVL

31 MAR 05

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SCU REMOVAL FROM UIA (AT VACUUM)

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 2 pages

SCU REMOVAL FROM UIA (AT VACUUM)

C-Lk IV BAG – EVA Ratchet, 7/16" Socket 6" EXT

- UIA
1. √PWR EV-1,2 switch (two) – OFF
√PWR EV-1,2 LEDs (four) – Off
√WATER SUPPLY EV-1,2 vlv (two) – CLOSE
√OSCA – O2 CLOSED (O2 3AKP)
 2. √**MCC-H** that power and O2 inhibits in place

NOTE

Removal of ОПЛАН caps is technique sensitive. For removal instructions, the cap is pushed inward and rotated clockwise (opposite the displayed arrow) 1/8 turn; then, the cap is pulled outward.

3. ОПЛАН-I (II) cap 2 ←|→ OSCA
ОПЛАН-I (II) cap 3 ←|→ OSCA
4. OSCA ↻ PRESS (НАДДУВ)
5. √OXYGEN EMU 1,2 vlv (two) – OPEN
6. OXYGEN ORLAN vlv → OPEN
7. √EMU O2 SUPPLY PRESS gauge ≅ 0
√ORLAN O2 SUPPLY PRESS gauge ≅ 0

SSRMS
PDGF
SSRMS
LEE
LATCH

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SCU REMOVAL FROM UIA (AT VACUUM)

(ISS EVA SYS/7A - ALL/FIN 1)

Page 2 of 2 pages

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SCU REMOVAL FROM UIA (AT VACUUM, CONT'D)

8. OSCA ↺ O2 CLOSED (O2 3AKP)
9. ОПЛАН-I (II) cap 2 → | ← OSCA
ОПЛАН-I (II) cap 3 → | ← OSCA
10. OXYGEN EMU 1,2 vlv (two) → CLOSE
11. OXYGEN ORLAN vlv → CLOSE
12. Mating bolts (two) ↺ using ratchet with 7/16" socket
(≅15 turns each).
13. Strain relief hooks (two) ← | → tether points (two) on
C-Lk wall
14. Remove SCU from stowage straps on C-Lk wall.
15. Remove stowage pouches from C-Lk restraint straps
(leave DCM connectors inside pouches).
16. Stow 7/16" socket with 6" extension (in socket caddy)
and EVA ratchet in C-Lk IV Bag.

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C-LK
EGRSS
C-LK
INGRS

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CREWLOCK EGRESS

(ISS EVA SYS/7A - ALL/FIN 1)

Page 1 of 1 page

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CREWLOCK EGRESS

|

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SCU
RMVL

EV1

1. Thermal cover → open
2. Egress Crewlock.
3. Verify hook locks installed in safety tether hooks on external D-rings.
4. Safety tether short strap →|← EMU D-ring or extender, double tether to reel, unlock reel
5. Waist tether ←|→ internal Crewlock D-ring, stow on EMU or clear of hatch opening

EV2

6. Repeat steps 1 to 5
7. Thermal cover → close

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CREWLOCK INGRESS

(ISS EVA SYS/7A - ALL/FIN 4)

Page 1 of 1 page

CREWLOCK INGRESS

- BOTH 1. Complete Tool Inventory.
- 2. √Tool Boxes closed, latched
- EV2 3. Waist tether →|← internal Crewlock D-ring
- 4. Safety tether short strap ←|→ EMU
Safety tether short strap →|← external hatch handrail
- 5. √Reel unlocked, retract cable slack
- 6. Ingress Crewlock.
- 7. Retrieve SCU, remove DCM cover.
SCU →|← DCM, √Locked
- EV1 8. Repeat steps 3 to 7.
- BOTH 9. sw WATER → OFF (fwd)
- 10. Thermal cover → close
Attach Velcro strap.

CAUTION

Do not close hatch until EMU
WATER – OFF for 2 minutes.

- 11. √EV hatch clear of FOD and obstructions.
- 12. EV hatch → close and lock
- 13. Go to PRE REPRESS portion of {CREWLOCK
DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA
SYS: EVA PREP/POST).

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EMERGENCY

	<u>GND</u>	<u>ISS</u>
4.105 EMERGENCY CREWLOCK REPRESS	557	557
4.110 POST EMERGENCY CREWLOCK REPRESS	559	559
4.115 EXPEDITED SUIT DOFFING	561	561
4.120 DCS TREATMENT	563	563
4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)	567	567
4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)	575	575
4.135 SAFER RESCUE	579	579
4.140 ISS EVA DECONTAMINATION	581	581
4.145 CONTAMINATION TEST	591	591
4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA	597	597
4.152 EQUIPMENT LOCK CONFIG FOR VACUUM	603	603
4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE	611	MPV

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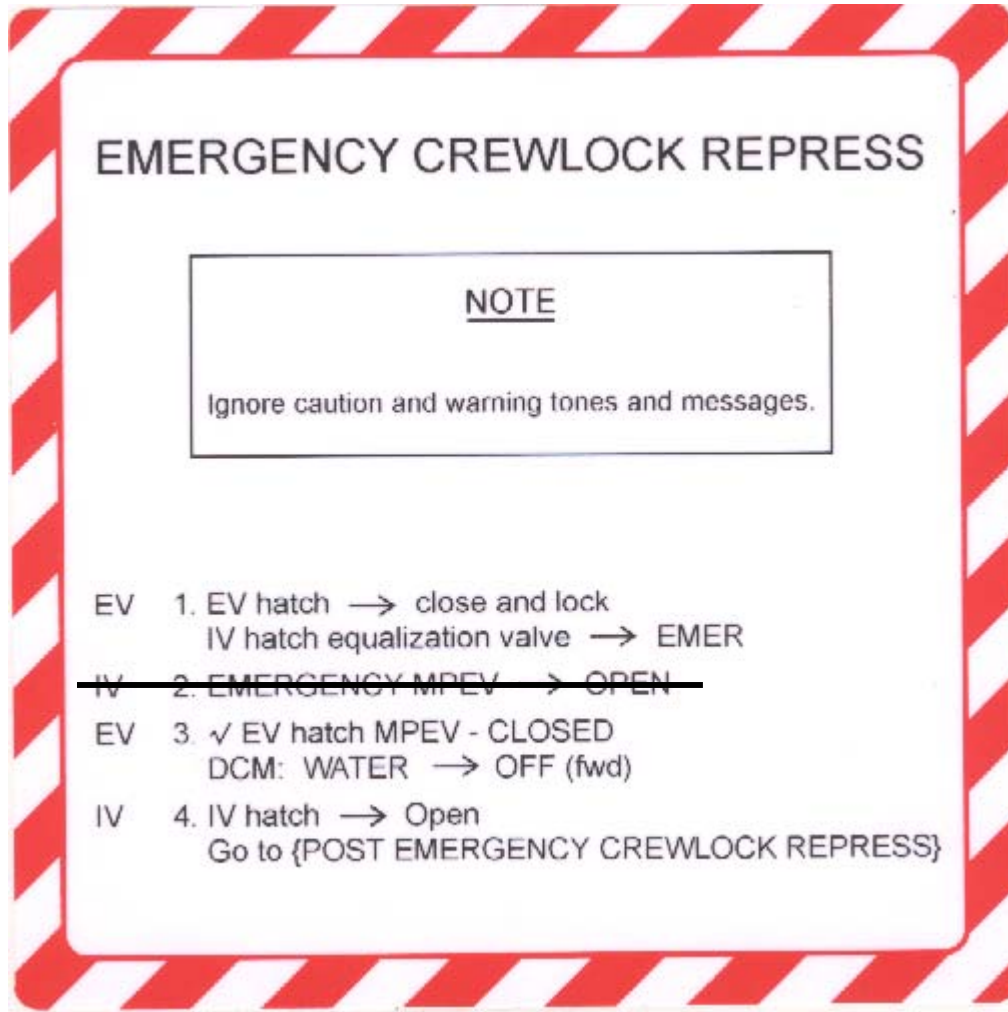
4.105 EMERGENCY CREWLOCK REPRESS

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 1 page

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OBJECTIVE:

In an emergency, these steps need to be performed for a rapid Emergency Crewlock Repress. This decal is posted on the inside of the EV hatch and on both sides of the IV hatch.



Go to {4.110 POST EMERGENCY CREWLOCK REPRESS} (SODF: ISS EVA SYS: EMERGENCY).

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4.110 POST EMERGENCY CREWLOCK REPRESS

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 1 of 1 page

I

(10 Minutes)

OBJECTIVE:

Following an Emergency Crewlock Repress, this procedure safely configures both EV crewmembers in their suits. Different steps are taken for the affected crewmember and the unaffected crewmember.

WARNING

This procedure should not be performed following a Cuff 4 DCS incident. If a Cuff 4 DCS incident, go to {4.120 DCS TREATMENT}, all (SODF: ISS EVA SYS: EMERGENCY).

AFFECTED CREWMEMBER

- DCM 1. PURGE vlv → op (up)
2. O2 ACT → OFF
3. √STATUS: SUIT P < 0.4 (compare with guage)
4. Gloves ←|→ EMU
5. Helmet ←|→ HUT
- DCM 6. SCU →|← DCM
- UIA 7. sw PWR EV-1(2) → ON
- √PWR EV-1(2) EMU LED – On
- √PWR EV-1(2) VOLTS: 18.0 to 19.0
- DCM 8. sw POWER → SCU
- If single crewmember aborting EVA
- IV 9. √**MCC-H** for further steps >>

UNAFFECTED CREWMEMBER

- DCM 10. O2 ACT → IV
11. SCU →|← DCM
- UIA 12. sw PWR EV-1(2) → ON
- √PWR EV-1(2) EMU LED – On
- √PWR EV-1(2) VOLTS: 18.0 to 19.0
- DCM 13. sw POWER → SCU
14. √**MCC-H** for further steps

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4.115 EXPEDITED SUIT DOFFING

(ISS EVA SYS/7A - ALL/FIN 2/ PAPER ON ISS) Page 1 of 2 pages

I

(20 Minutes)

OBJECTIVE:

Do off the EMU in a fast, yet safe manner. Performed in case of an emergency.

CAUTION

Verify EV crew is clear of hatch mechanism.

IV

When equalization complete

1. Open IV Hatch per decal.

IV Hatch equalization valve → OFF

* If required, IV use damp towel to clean gloves.

SAFER DOFFING (5 MINUTES)

SAFER
IV

2. Latch → ENG

3. Latch ↺ until release (~ 90 deg)

4. PLSS ←|→ Thruster Towers

SUIT DOFFING (10 MINUTES)

DCM

5. O2 ACT → OFF

6. PURGE vlv → op (up)

7. Engage EMU in EDDA.

PLSS

If EMU TV capability

8. EMU TV Power Cable ←|→ EMU TV

DCM

9. √STATUS: SUIT P < 0.4 (compare with gauge)

Gloves ←|→ EMU

10. Helmet ←|→ EMU

DCM

11. sw FAN → OFF

12. Waist Ring ←|→ HUT

13. LCVG ←|→ Multiple Water Connector

14. Biomed Pigtail ←|→ Electrical Harness

15. Do off comm cap.

4.115 EXPEDITED SUIT DOFFING

(ISS EVA SYS/7A - ALL/FIN 2/ PAPER ON ISS) Page 2 of 2 pages

16. Doff HUT.

17. Doff LTA.

If taking EMUs to shuttle

- | | |
|-----|---|
| UIA | <p>18. Waist ring → ← HUT</p> <p>19. Gloves → ← EMU</p> <p>20. sw PWR EV-1,2 (two) → OFF</p> <p style="padding-left: 20px;">√PWR EV-1,2 LEDs (four) – Off</p> <p>21. Remove Metox from EMUs (not required if LiOH is installed).</p> <p>22. PLSS thermal cover on back of EMU → close</p> |
| DCM | <p>23. SCU ← → DCM</p> <p>24. Install helmet and helmet cover.</p> <p>25. Transfer EMU to shuttle.</p> |

EMU/AIRLOCK CONFIGURATION

When time permits

- | | |
|-----|--|
| DCM | <p>26. IV Hatch equalization valve → OFF</p> <p>27. Install WATER switch guards (two).</p> <p>28. √sw Glove heater (two) – OFF</p> <p>29. Stow lower arm and glove cable connectors under TMG.</p> |
|-----|--|

If EMU TV capability

30. EMU TV Power Cable →|← Ground Plug
31. Go to {1.240 POST EVA}, step 28 (SODF: ISS EVA SYS: EVA PREP/POST).

4.120 DCS TREATMENT

(ISS EVA SYS/7A - ALL/FIN 3) Page 1 of 4 pages

DCS Signs and Symptoms Associated with Each Cuff Class Defined in Cuff Checklist

1

- Determine Cuff Class

Cuff Class 1

Cuff Class 2 or 3 (Report to **MCC-H**)

Cuff Class 4 (Report to **MCC-H**)

4

NOTE
DO NOT perform 4.110 POST EMERGENCY CREWLOCK REPRESS.

- Abort EVA (Cuff Checklist page 6) with ingress assist from unaffected crewmember.
- Unaffected crewmember perform ISS safing.
- Unstow Respiratory Support Pack (RSP).
- Refer to {**ACLS ALGORITHM**} (SODF: ISS MED: ACLS), then:

Crewmember conscious?

No Yes

6

Can crewmember speak in full sentences without respiratory distress?

No Yes

4 19

7

- Perform {**1.240 POST EVA**} (SODF: ISS EVA SYS: EVA PREP/POST), then:
- Proceed to US Lab, in close proximity of ChCS Rack (LAB1D4), and treat affected crewmember per {**CARDIOPULMONARY RESUSCITATION: CPR**} (SODF: ISS MED: BASIC LIFE SUPPORT), then:
- √**MCC-H** for further action for incapacitated crewmember

2

- Continue EVA.
- If Symptoms resolve upon REPRESS go to Cuff Class 2, block 5
- Report to Surgeon next PMC.

3

- Terminate EVA (Cuff Checklist page 7).
- Unaffected crewmember stow safety tether, perform worksite cleanup and/or ISS safing.
- √**MCC-H** for ISS config
- Perform **INGRESS** (Cuff Checklist page 35).
- If terminating for Cuff Class 3
- PMC on GND2
- COMM Mode → HL

ATU4(5)

- IV dial GND2

5

- Perform PRE-REPRESS portion of {**CREWLOCK DEPRESS/REPRESS CUE CARD**} (SODF: ISS EVA SYS: EVA PREP/POST).
- Perform REPRESS portion of {**CREWLOCK DEPRESS/REPRESS CUE CARD**} (SODF: ISS EVA SYS: EVA PREP/POST).
- Remain on SCU.
- Unaffected crewmember perform {**1.240 POST EVA**} (SODF: ISS EVA SYS: EVA PREP/POST) per FLIGHT PLAN; do not perform **EVA COMM AND AIRLOCK ENVIRONMENT DECONFIG**.
- Perform DCS In-suit Exam {**BENDS - DECOMPRESSION SICKNESS: DCS**} (SODF: ISS MED: A THROUGH B).
- PMC (expect GND2 private).

Does **MCC-H** require Metox canister changeout?

Yes No

9

8

- Perform {**2.120 METOX/LIOH REPLACEMENT (MANNED)**} (SODF: ISS EVA SYS: EMU CONTINGENCY), then:

9

① EVA terminated to prevent progression to Cuff Class 4. If Cuff 2, affected crewmember will assist other EV with minor worksite cleanup, if possible, to expedite cleanup and then terminate EVA.

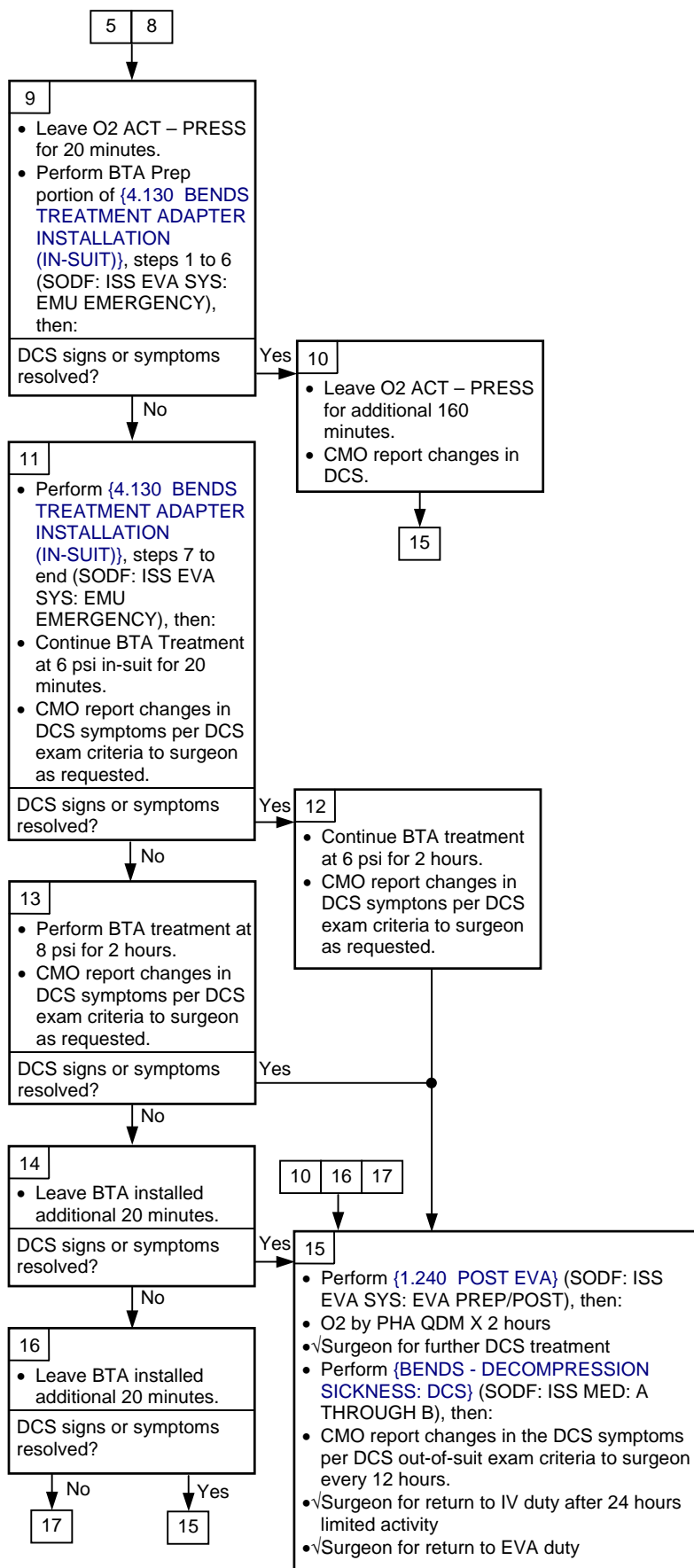
② If estimated time reqd for DCS treatment exceeds Metox canister consumables, a changeout should be performed. If 10 or 12 required, minimum treatment is ~3 hours.

③ For Cuff Class 3 only, affected crewmember waiting in Crewlock needs to be in contact with surgeon via PMC due to severity and potential progression of symptoms.

④ Cuff Class 4 symptoms may be secondary to Type 2 DCS which is a medical emergency. Unstowing the resuscitator enables IV crew to be prepared to administer CPR, if required. Because it is critical to repress a Class 4 quickly, this may result in a one crewmember repress.

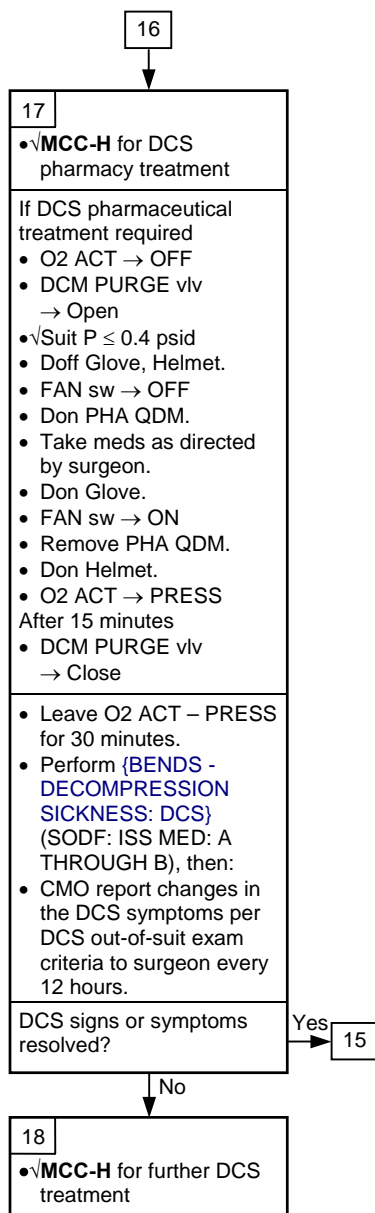
4.120 DCS TREATMENT

(ISS EVA SYS/7A - ALL/FIN 3) Page 2 of 4 pages



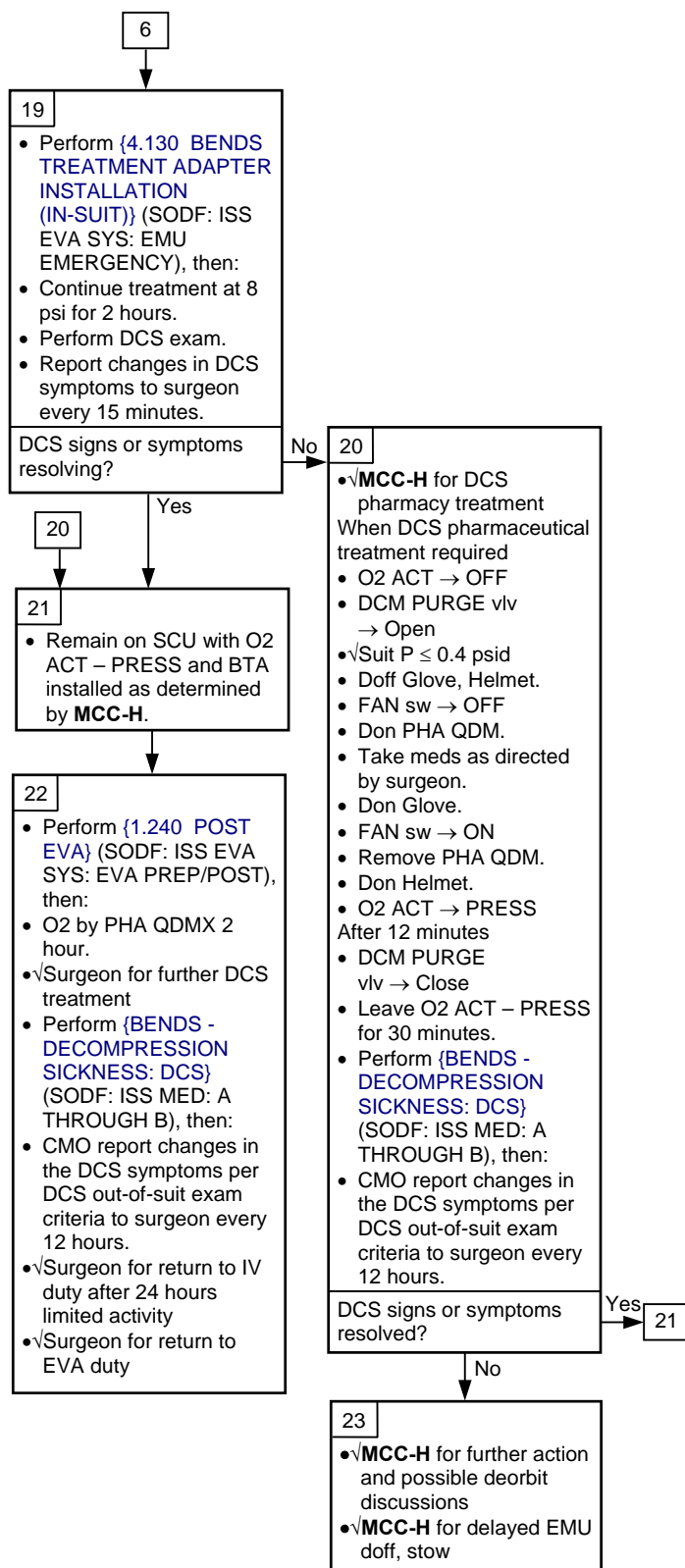
4.120 DCS TREATMENT

(ISS EVA SYS/7A - ALL/FIN 3) Page 3 of 4 pages



4.120 DCS TREATMENT

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4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 1 of 7 pages

(60 Minutes)

OBJECTIVE:

To install the Bends Treatment Adaptor (BTA) for Decompression Sickness (DCS) treatment. Performed if symptoms confirmed post suit doffing.

BTA PREP (10 MINUTES)

1. Unstow BTA and 3/8" Wrench.
 - PLSS 2. Cut/break TMG tacks.
Refer to Figure 1.
 3. Unzip PLSS TMG (avoid pulling on antenna cable).
 4. Remove Impact Shield.
Disconnect hatch marked cable P3 (cut cable if required).
Refer to Figure 1.
 5. Remove Test Port F Plug on SOP using 3/8" end of BTA Wrench
(4 to 6 turns ↺).
Refer to Figure 2.
 - BTA 6. Stow Test Port F Plug on BTA.
Refer to Figure 1.
- If Metox (LiOH) canister replacement required by **MCC-H**
7. Unstow new Metox (LiOH) canister.
 8. Remove used Metox (LiOH) canister.
 9. Install new Metox (LiOH) canister using label on canister for proper orientation.
Report Metox canister barcode to **MCC-H** as comm permits.
 10. Install caps on used Metox (LiOH) canister.
Temporarily stow canister for future regeneration.
Tape an 'X' on the used LiOH canister and stow.

BTA TREATMENT (50 MINUTES)

11. √SCU →|← DCM
- BTA 12. Unstow Poppet Keeper Screw from BTA.
- PLSS 13. Open Positive Pressure Relief Valve (PPRV) using BTA poppet keeper
(thread ↻, pull, tighten nut).
Refer to Figure 1.
14. Align BTA Engage mark with PPRV Mark.

BTA →|← PPRV (rotate BTA ↻ to Lock)

√BTA Locked

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS)

Page 2 of 7 pages

15. Don MAG, LCVG, biomed.
16. Fill Drink Bag, remove gas.
Insert bag in Restraint Bag.
Install Drink Bag, Restraint Bag in HUT.
Dispose of fill tool in EMU Equipment Bag trash.

UIA 17. √OXYGEN EMU 1(2) vlv – OPEN

DCM 18. sw POWER → BATT

CAUTION
EMU must be on BATT power when UIA suit power is turned on.

PSA 19. √sw SUIT SELECT – OFF
√sw EMU MODE EMU1(2) – PWR

20. sw MAIN POWER → ON

√MAIN POWER LED – On

21. sw SUIT SELECT → EMU 1(2)

√EMU 1(2) LED – On

√EMU 1(2) Volts: 18.0 to 19.0

UIA 22. sw PWR EV-1(2) → ON

√PWR EV-1(2) EMU LED – On

DCM 23. sw POWER → SCU

24. √Waist ring – op

25. Don LTA (attach donning handles as required).

26. √Suit arms aligned

√Wrist disconnects – op

27. Don thumb loops.

28. √Biomed connector outside of HUT

29. Don HUT.

Release thumb loops.

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 3 of 7 pages

- 30. √Suit arms aligned
- 31. Don comm cap.
- 32. √sw COMM mode – HL (vol as required)

If biomed downlink desired

- | | |
|------------------------|---|
| MCC-H/IV
PCS | <u>33. CONFIGURING FOR EMU COMM</u> <ul style="list-style-type: none">33.1 <u>Powering Up UHF 1 for EVA Operations on 414.2 MHz</u>
Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16
(SODF: C&T: NOMINAL: UHF), then:33.2 <u>Configuring Audio Subsystem for EVA Operations</u>
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then: |
| DCM | <ul style="list-style-type: none">34. sw COMM mode → PRI35. sw Comm FREQ → LOW36. Biomed pigtail → ← electrical harness |
- 37. LCVG →|← Multiple Water Connector
 - √Multiple Water Connector locked
 - 38. √Thermal cover clear of waist ring
 - 39. Waist ring → engage position
Waist ring →|← HUT
 - √Waist ring locked
 - 40. Wrist ring → engage position
 - 41. Don EV gloves.
 - √EV gloves locked
 - 42. √Mic boom position
| DCM | - 43. sw FAN → ON - 44. √Electrical harness clear of neck ring - 45. Don helmet. - √Helmet locked - 46. √Helmet purge vlv – Closed, locked |

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 4 of 7 pages

DCM 47. √PURGE vlv – Op (up)

48. O2 ACT → PRESS, begin purge clock (12 minutes)

Record start of purge clock.

GMT (PURGE START) ____/____:____ ____

PCS 49. Verifying Condensate Tank Configuration

Lab: ECLSS: H2O Vent

Lab Water Vent

√Water Vent System Status – Inhibited

If Water Vent System Status – Enabled

√**MCC-H**

√Condensate Tank Qty 1(2) < 42.5 kg

If Condensate Tank Qty 1(2) > 42.5 kg

√**MCC-H**

UIA 50. √WATER EV-1(2) SUPPLY vlv – CLOSE

51. WATER EV-1(2) REG vlv → WASTE

When 12-minute purge complete and H2O WP < 7 and stable for ~ 1 minute

52. WATER EV-1(2) REG vlv → SUPPLY

GMT (PURGE END) ____/____:____ ____

DCM 53. PURGE vlv → CI (dn)

54. √STATUS: SUIT P: 4.2 to 4.4

NOTE

Suit P will increase about ~ 0.5 psi each time the O2 Act → OFF.

55. O2 ACT → OFF (until Suit P stabilizes)

56. O2 ACT → PRESS (for 15 seconds)

57. Repeat steps 55,56 until Suit P = 6.0 psig on BTA gauge.

NOTE

BTA relief valve relieves at 8.04 to 8.45 psig.

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 5 of 7 pages

58. Repeat steps 55,56 as required to maintain SUIT P = 6.0 psig.

NOTE

Initial treatment will be at 6 psid for Cuffs 2 and 3 and will be increased to 8 psid if symptoms do not resolve. Initial treatment for Cuff 4 will be 8 psid.

59. Contact Surgeon (**MCC-H**) for treatment length and changes in treatment pressure.

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS)

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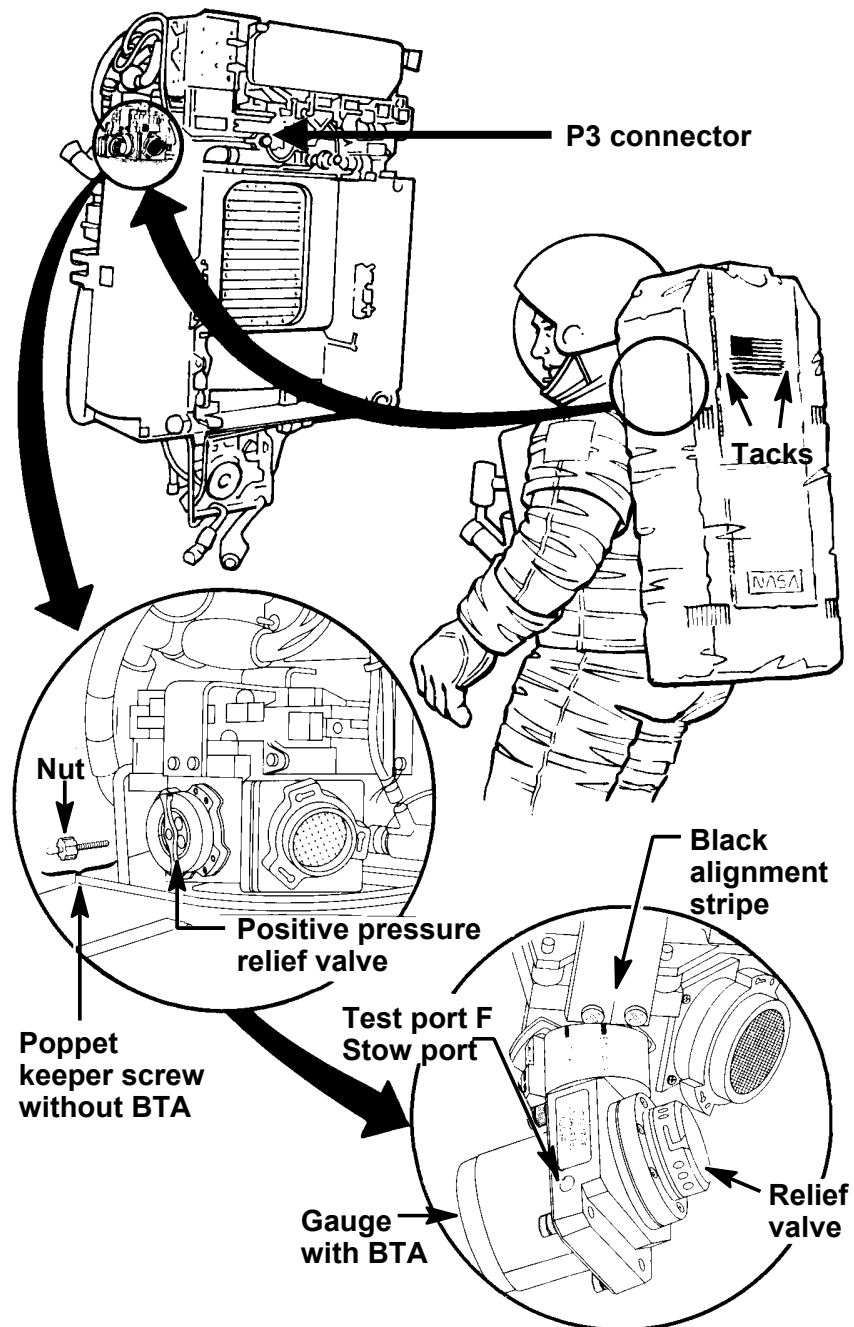


Figure 1.- BTA Location on EMU.

4.125 BENDS TREATMENT ADAPTER INSTALLATION (POST SUIT DOFFING)

(ISS EVA SYS/7A - ALL/FIN 3/PAPER ON ISS) Page 7 of 7 pages

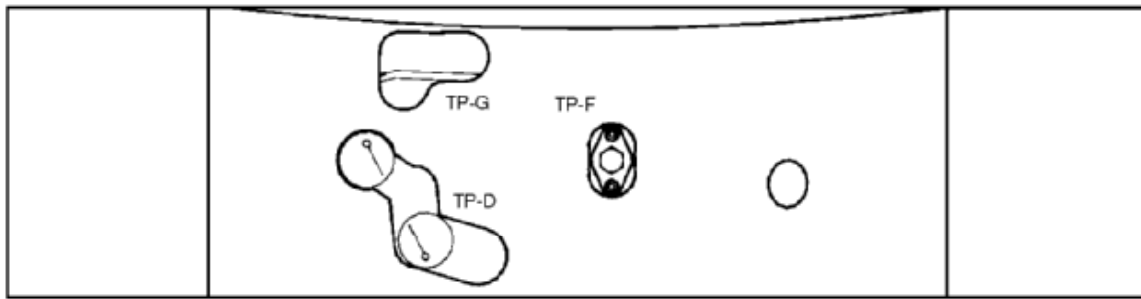


Figure 2.- Secondary Oxygen Package.

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4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

(ISS EVA SYS/7A - ALL/FIN 2/PAPER ON ISS) Page 1 of 4 pages

I

(70 Minutes)

OBJECTIVE:

To install the bends treatment adapter (BTA) for BTA operations. Performed while the crewmember remains pressurized in the suit.

BTA PREP (10 MINUTES)

1. Unstow BTA and 3/8" Wrench.
2. Cut/break TMG tacks.
Refer to Figure 1.
3. Unzip PLSS TMG (avoid pulling on antenna cable).
4. Remove Impact Shield.
Disconnect hatch marked cable P3 (cut cable if required).
Refer to Figure 1.

NOTE

It may be necessary to extend the legs forward to access the test port in a pressurized EMU.

5. Remove Test Port F Plug on SOP using 3/8" end of BTA Wrench (4 to 6 turns ↺).
Refer to Figure 2.
6. Stow Test Port F Plug on BTA.
Unstow poppet keeper screw from BTA, stow in EMU Servicing Kit.
Refer to Figure 1.

BTA TREATMENT (60 MINUTES)

7. √SCU →|← DCM
8. Align BTA Engage mark with PPRV Mark.
BTA →|← PPRV (rotate BTA ↻ to Lock)

√BTA locked
9. √OXYGEN EMU 1(2) vlv – OPEN
10. √sw POWER – SCU
11. √sw FAN – ON
12. √sw COMM mode – HL (vol as required)

4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

(ISS EVA SYS/7A - ALL/FIN 2/PAPER ON ISS) Page 2 of 4 pages

- If biomed downlink desired
- MCC-H/IV**
PCS
13. CONFIGURING FOR EMU COMM
- 13.1 Powering Up UHF 1 for EVA Operations on 414.2 MHz
Perform {2.701 UHF 1 ORU ACTIVATION}, steps 1 to 16
(SODF: C&T: NOMINAL: UHF), then:
- 13.2 Configuring Audio Subsystem for EVA Operations
Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 1 to 11 (SODF: C&T: NOMINAL: AUDIO), then:
- DCM
14. sw COMM mode → PRI
15. sw Comm FREQ → LOW
- PCS
16. Verifying Condensate Tank Configuration
Lab: ECLSS: H2O Vent
Lab Water Vent
- √Water Vent System Status – Inhibited
- If Water Vent System Status – Enabled
√**MCC-H**
- √Condensate Tank Qty 1(2) < 42.5 kg
- If Condensate Tank Qty 1(2) > 42.5 kg
√**MCC-H**
- UIA
17. √WATER EV-1(2) SUPPLY vlv – CLOSE
18. WATER EV-1(2) REG vlv → WASTE
- DCM
- When H2O WP < 7 and stable for ~ 1 minute
- UIA
19. WATER EV-1(2) REG vlv → SUPPLY
- DCM
20. √STATUS: SUIT P: 4.2 to 4.4
21. O2 ACT → OFF (until SUIT P stabilizes)

NOTE

Suit pressure will nominally increase when the O2 actuator is taken to OFF. SUIT P = H2O GP when the O2 ACT – OFF. For actual SUIT P > 5.9 psi, SUIT P can be directly read only as the H2O GP; actual SUIT P = 4.7 to 5.5 psi above BTA gauge pressure.

4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

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CAUTION

If BTA gauge pressure increases while O2 ACT – PRESS, set O2 ACT – OFF immediately to prevent a hazardous condition; contact **MCC-H**.

22. O2 ACT → PRESS (for 15 seconds), monitor BTA gauge not increasing
23. O2 ACT → OFF (until H2O GP stable)
24. Repeat steps 22 and 23 until H2O GP = 6.0 psid on DCM display with O2 ACT – OFF.
25. Repeat steps 22 and 23 as required to maintain H2O GP = 6.0 psid.

NOTE

Initial treatment will be at 6 psid for Cuffs 2 and 3 and will be increased to 8 psid if symptoms do not resolve. Initial treatment for Cuff 4 will be 8 psid.

26. Contact Surgeon (**MCC-H**) for treatment length and changes in treatment pressure.

4.130 BENDS TREATMENT ADAPTER INSTALLATION (IN-SUIT)

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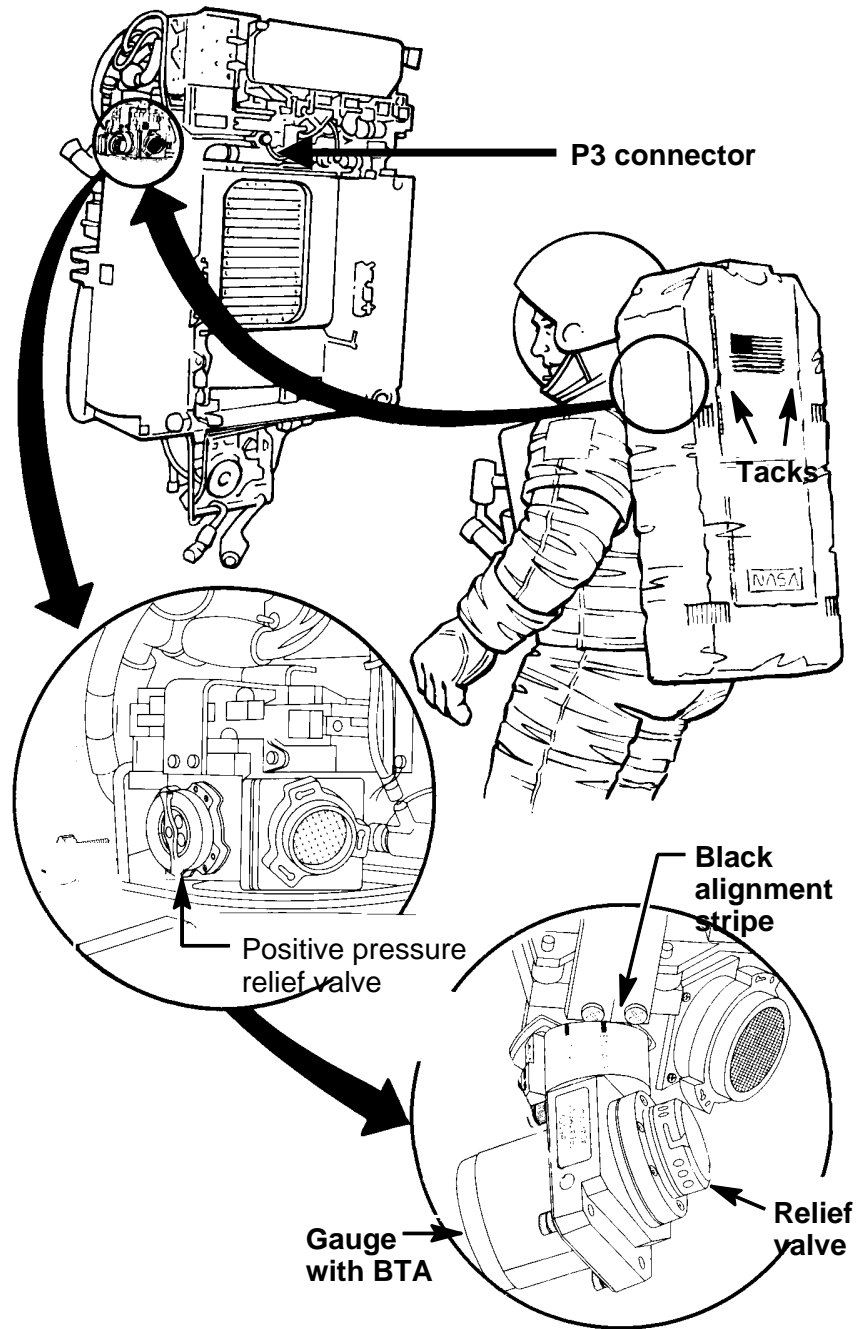


Figure 1.- BTA Location on EMU.

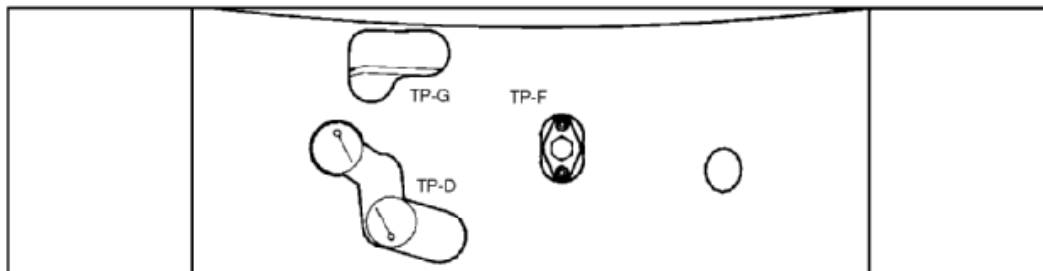


Figure 2.- Secondary Oxygen Package.

4.135 SAFER RESCUE

(ISS EVA SYS/7A - ALL/FIN 2/ PAPER ON ISS)

Page 1 of 1 page

I

OBJECTIVE:

To return a separated EV crewmember back to the vehicle using the Simplified Aid For EVA Rescue (SAFER). The IV crewmember will be reading the steps to the separated EV crewmember.

1. Deploy SAFER HCM.

HCM 2. sw PWR → ON

3. Fly to vehicle.
Monitor GN2 % and PWR %.

* If no gas flow

* √MAN ISOL vlv – OP (dn)

IV/
other EV 4. Provide GCA

IV 4.1 Provide range and range rate using Laser Range Finder, as required.

4.2 Configure WVS and ISS external cameras to assist separated EV crew.

4.3 Turn on external vehicle lights, as required.

EV 5. Tether to nearest structure.

√Connection

6. Tether to available safety tether or other EV crewmember.

√Connection

HCM 7. sw PWR → OFF

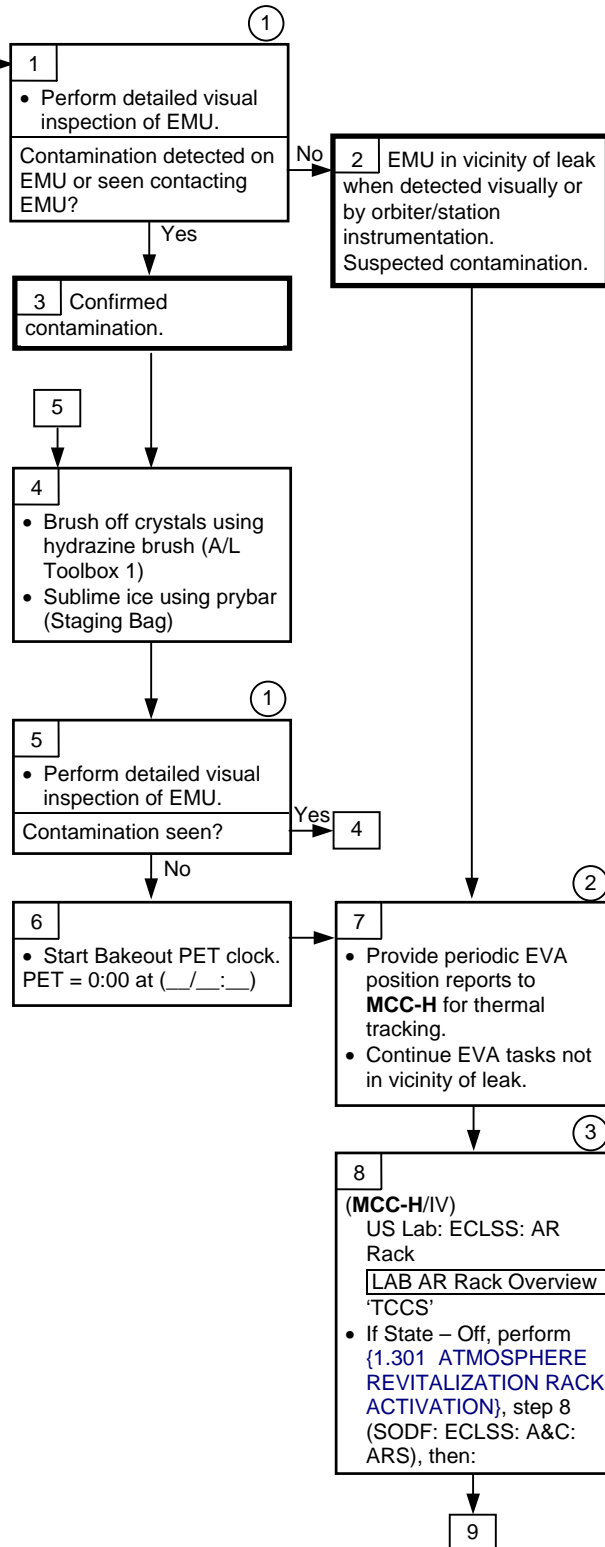
8. MAN ISOL vlv → CL (up)

9. √**MCC-H**

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Crew Visually
Detects Plume,
Leaking QD,
White Crystals,
or "Snow"
Coming from
Orbiter/Station
During EVA

Orbiter/Station
Chemical
System Leak
Suspected Due
to Steady (not
Step Function)
Decrease in
Pressure or
Temperature



①

Ammonia visual inspection should be performed in night or shaded ambient light with helmet spot lights used to illuminate TMG. Use of sun visor during inspection should be avoided. View TMG from an oblique angle. The following are indications of ice on the EMU:

- Loss of TMG thread pattern.
- Waxy gloss or hard pack snow appearance.
- Unusual contours.

②

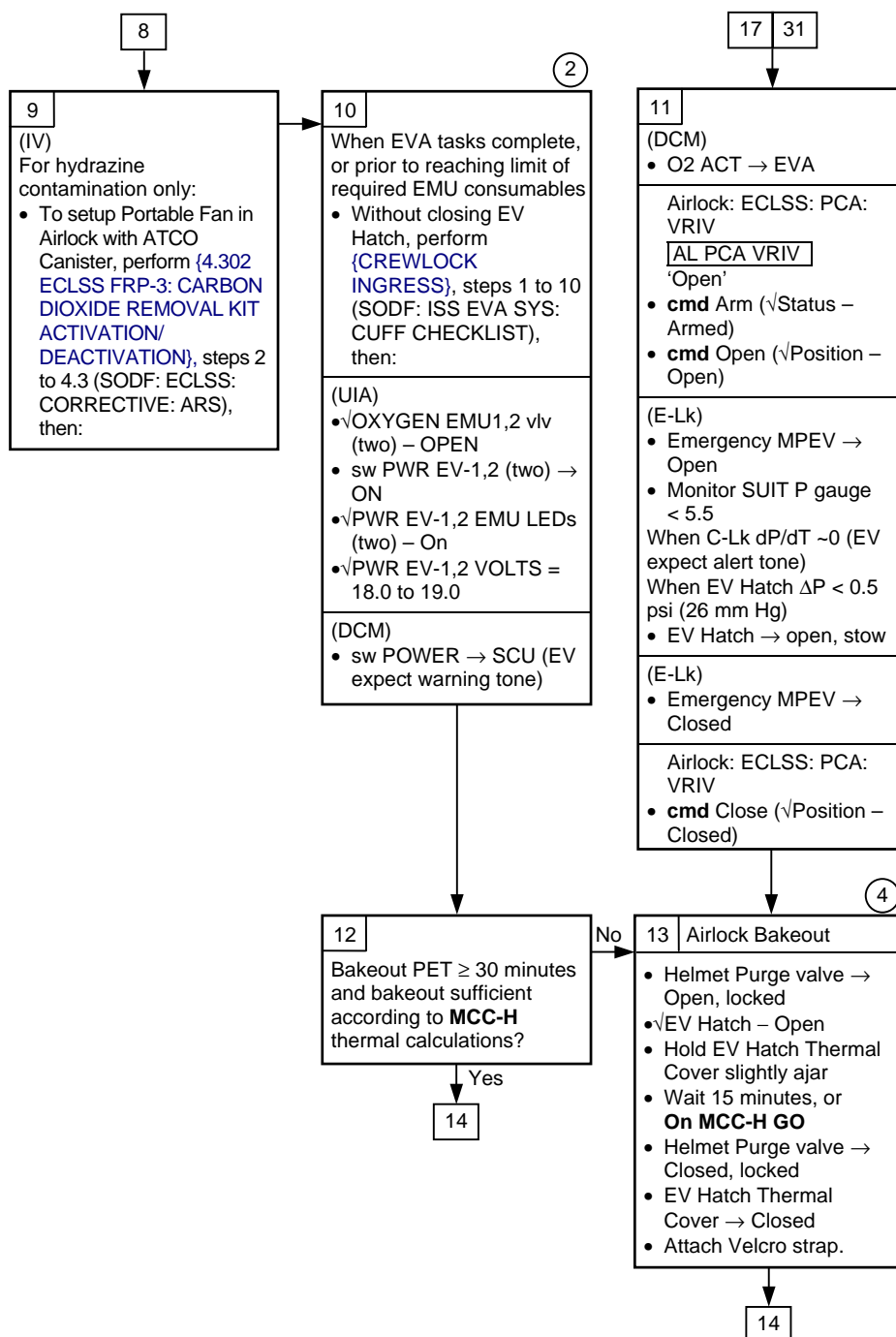
For confirmed contamination 2:00 (2:15 if from ISS thruster) of EMU consumables must be available to support activities from ingress through EMU doffing. For suspected contamination 0:55 (1:10 if from ISS thruster) of consumables required. EVA tasks must be deferred to protect these consumables. Bakeout on SCU does not consume Metox/LiOH if Helmet Purge valve is open.

③

All displays in this procedure are on the PCS, unless otherwise noted.

4.140 ISS EVA DECONTAMINATION

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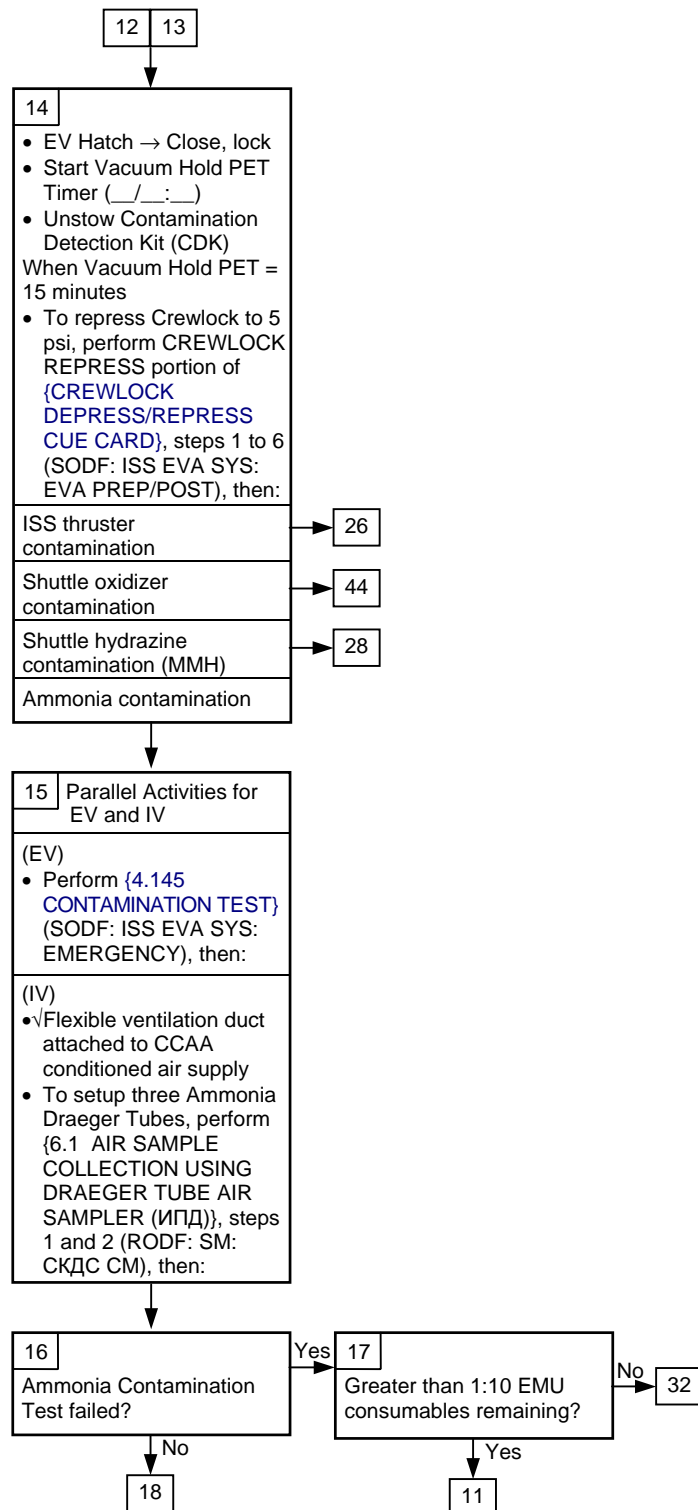


2
For confirmed contamination 2:00 (2:15 if from ISS thruster) of EMU consumables must be available to support activities from ingress through EMU doffing. For suspected contamination 0:55 (1:10 if from ISS thruster) of consumables required. EVA tasks must be deferred to protect these consumables. Bakeout on SCU does not consume Metox/LiOH if Helmet Purge valve is open.

4
Crew should remain in Crewlock throughout Airlock Bakeout. However, if temporary egress is required, SCU strain relief hook must be connected to EMU D-Ring.

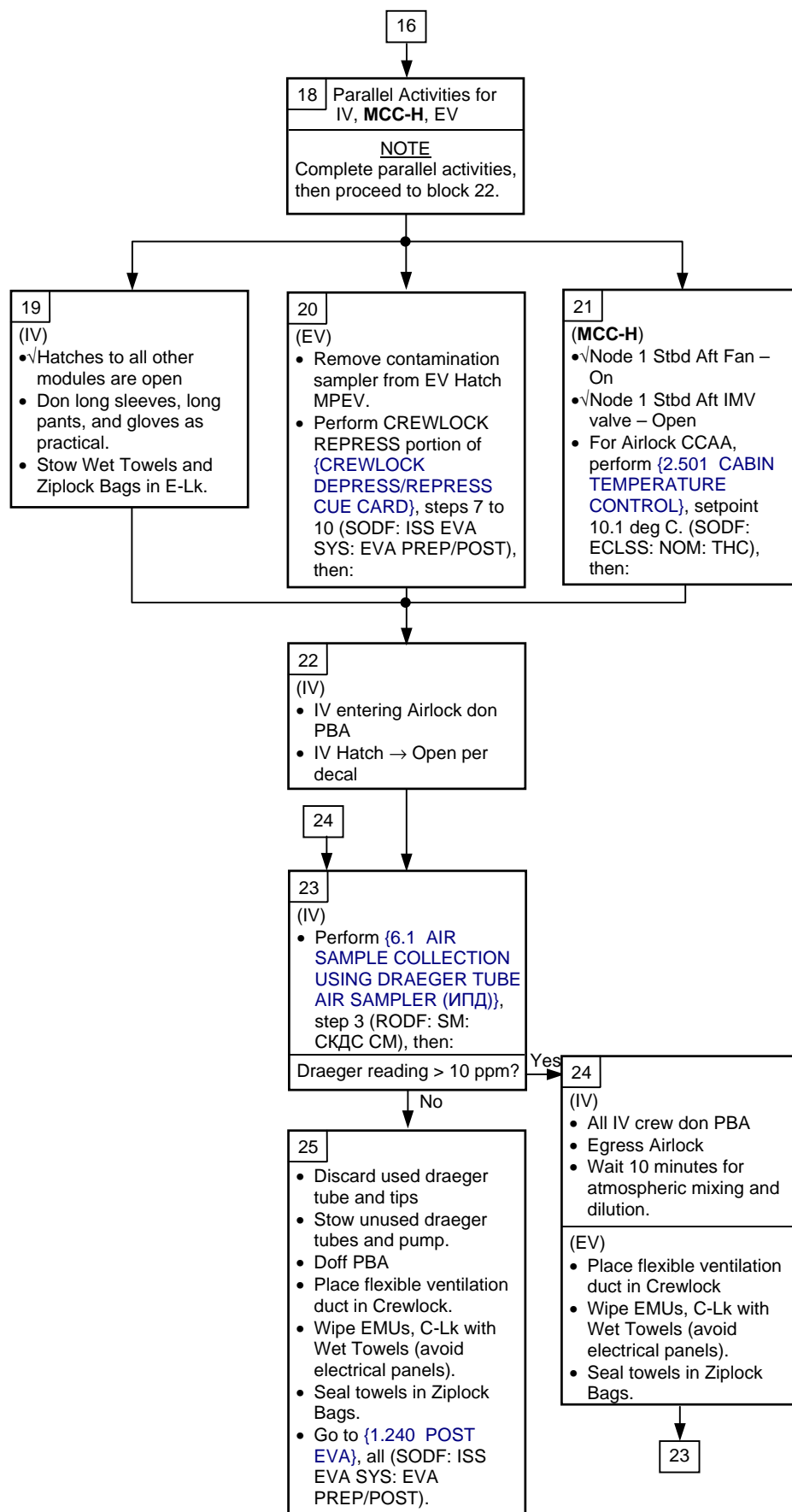
4.140 ISS EVA DECONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 3 of 9 pages



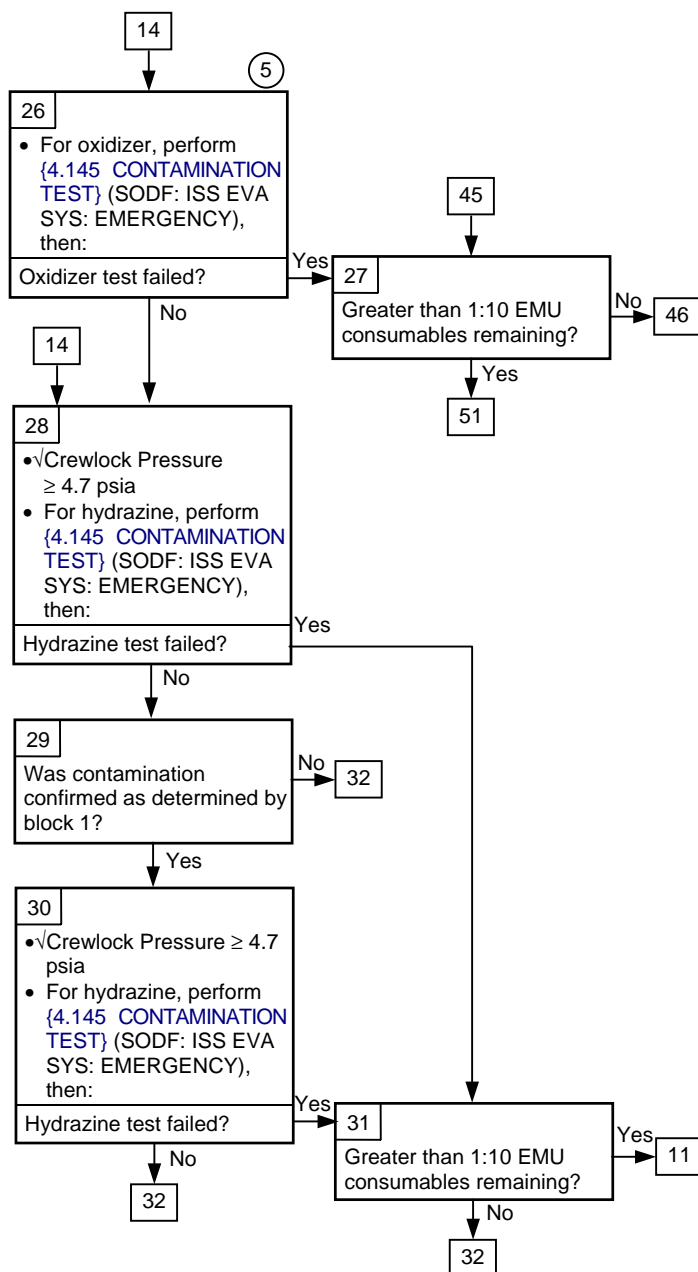
4.140 ISS EVA DECONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 4 of 9 pages



4.140 ISS EVA DECONTAMINATION

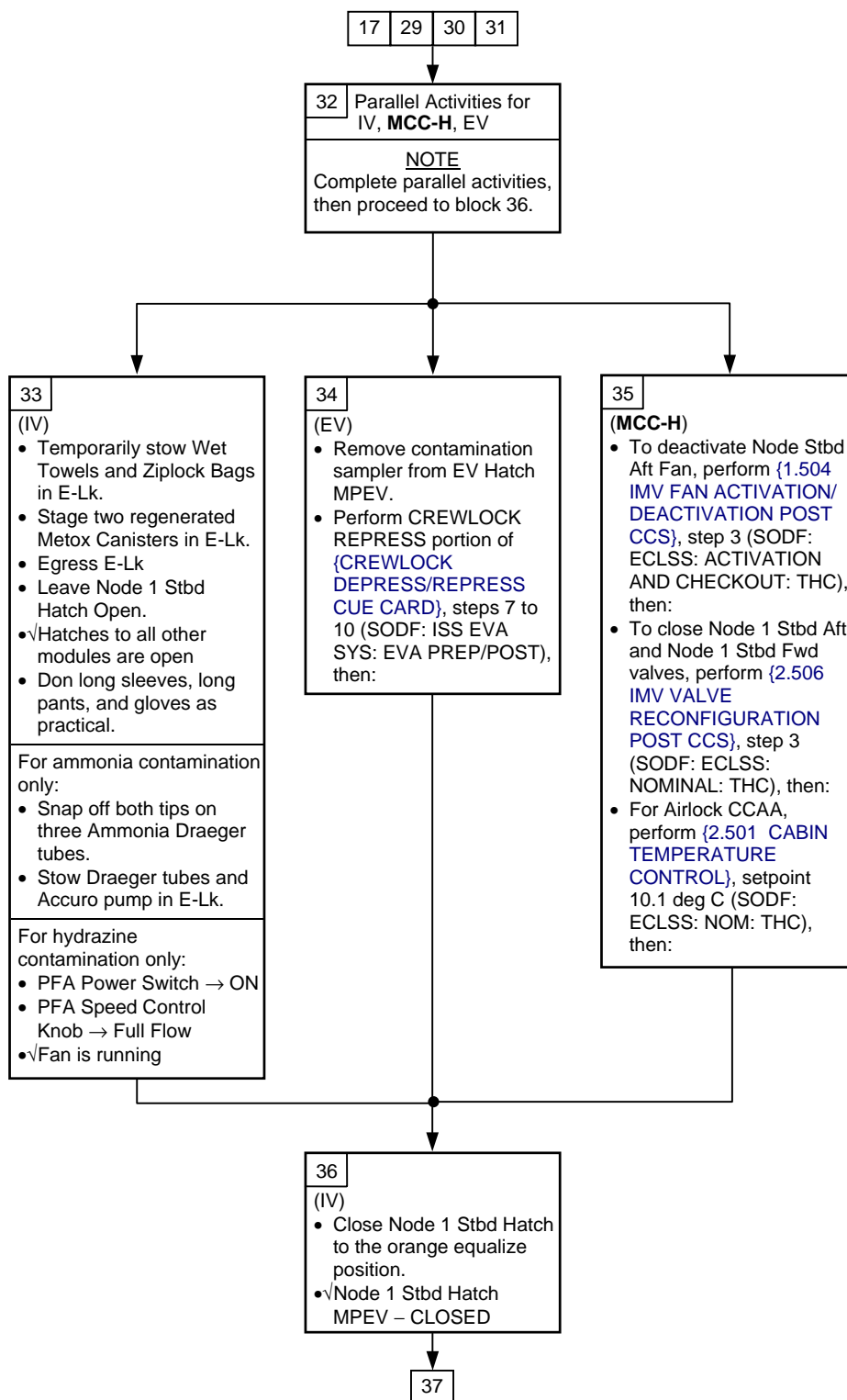
(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 5 of 9 pages

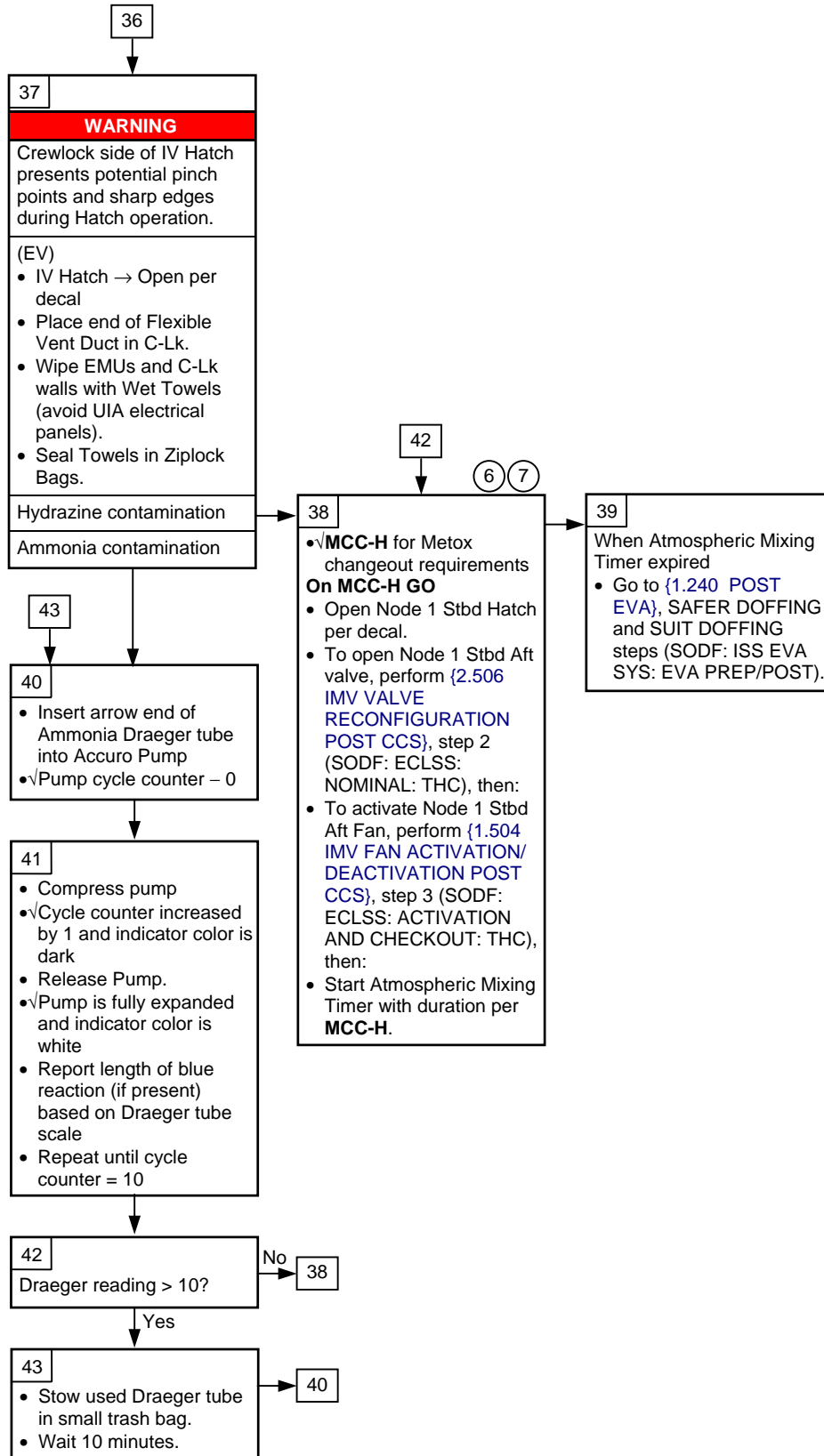


⑤
On ISS, it is impossible to determine if a propulsion leak was fuel or oxidizer. Therefore tests must be performed for both oxidizer and UDMH.

4.140 ISS EVA DECONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 6 of 9 pages



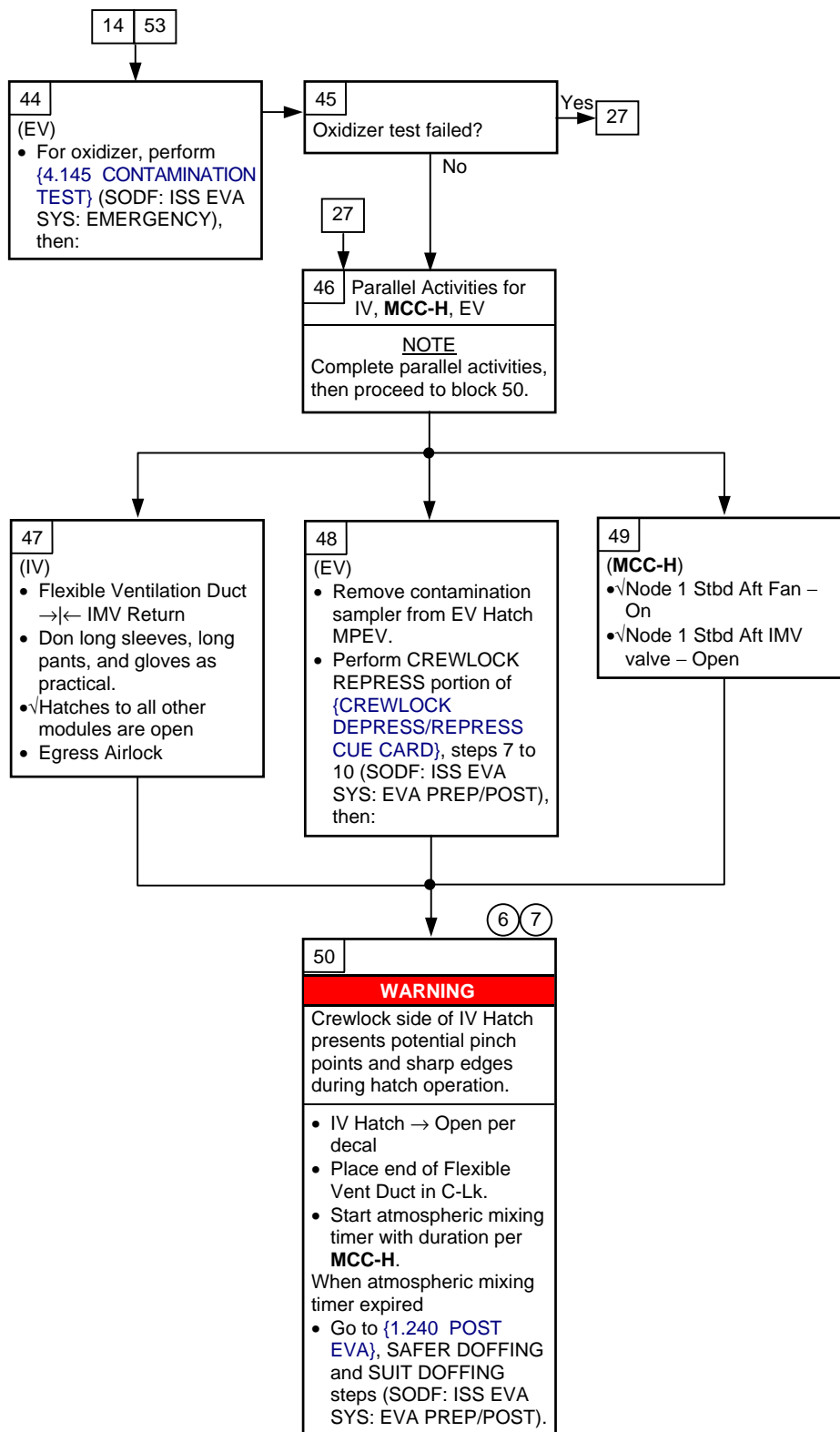


⑥ Atmospheric mixing will dilute Airlock atmosphere by 50 % every 6 minutes. Mixing will be 99 % complete after 42 minutes. Maximum dilution is approximately 14:1 with shuttle present and 12:1 without shuttle. Minimum mixing time assuming Contamination Test passed at 5 psi is 5 minutes for MMH and 10 minutes for UDMH.

⑦ IV crewmembers must remain outside of Airlock during atmospheric mixing time to avoid localized regions of elevated concentration. If IV must enter Airlock before mixing complete to assist EV crew, don PBA.

4.140 ISS EVA DECONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 8 of 9 pages

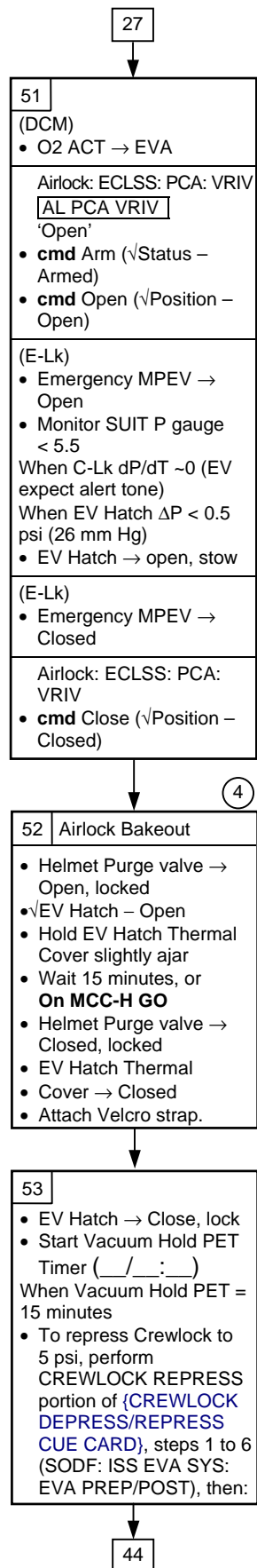


⑥
Atmospheric mixing
will dilute Airlock
atmosphere by 50 %
every 6 minutes.
Mixing will be 99 %
complete after 42
minutes. Maximum
dilution is
approximately 14:1
with shuttle present
and 12:1 without
shuttle. Minimum
mixing time
assuming
Contamination Test
passed at 5 psi is
5 minutes for MMH
and 10 minutes for
UDMH.

⑦
IV crewmembers
must remain outside
of Airlock during
atmospheric mixing
time to avoid
localized regions
of elevated
concentration. If IV
must enter Airlock
before mixing
complete to assist
EV crew, don PBA.

4.140 ISS EVA DECONTAMINATION

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 9 of 9 pages



④

Crew should remain in Crewlock throughout Airlock Bakeout. However, if temporary egress is required, SCU strain relief hook must be connected to EMU D-Ring.

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4.145 CONTAMINATION TEST

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 1 of 5 pages

OBJECTIVE:

This procedure is performed in conjunction with 4.140 ISS EVA DECONTAMINATION. It is performed with the Crewlock at 5 psia following suspected ammonia, oxidizer, or hydrazine contamination.

IV 1. √IV Hatch equalization valve – OFF

2. Wait 30 seconds for pressure stabilization.
Record Crewlock pressure.

	1	2	3
2. Crewlock Pressure			

EV C-Lk 3. Place ISS Contamination Sampler over EV Hatch MPEV.

WARNING

Even small loads imparted on ISS Contamination Sampler during testing can produce false negative results. All tethers should be removed from sampler after installation on EV Hatch MPEV.

4. Remove tethers from ISS Contamination Sampler.

5. √Crewlock lights (two) – ON, max intensity

6. Go to the appropriate chemical test steps.

7. AMMONIA CONTAMINATION TEST

7.1 Using RET, retrieve Ammonia Detector from Contamination Detection Kit.

7.2 Verify Draeger tube color – yellow

CAUTION

Minimize contact with the fracture regions of the Draeger tube. Minor glove RTV damage is possible, but protective pressure bladders and restraints are unaffected.

7.3 Using equipment hook of RET as a lever, break off both tether points on Ammonia Detector.

7.4 Insert Ammonia Detector into ISS Contamination Sampler with orientation that allows number scale to be read.

4.145 CONTAMINATION TEST

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 2 of 5 pages

- 7.5 ✓ISS Contamination Sampler fully seated on EV Hatch MPEV
✓Ammonia Detector fully seated in ISS Contamination Sampler

WARNING

Precise sampling times are critical for accurate testing. IV should coordinate start of timer with opening of EV Hatch MPEV.

- 7.6 EV Hatch MPEV – OPEN

IV

- 7.7 Start timer (03:30 sampling time).

When timer expired

EV

- 7.8 EV Hatch MPEV – CLOSED

NOTE

If ammonia is present, Draeger tube will turn deep blue.

IV

- 7.9 Compare Crewlock pressure to step 2.

If Crewlock $\Delta P \geq 0.1$ psi (indicates leak in sampling hardware)

MCC-H/IV

- 7.10 Verify EV Hatch Thermal Cover – Closed

IV(EV)

- 7.11 To repress Crewlock to 5.0 psi
IV hatch equalization vlv → throttle NORM to OFF

- 7.12 Go to step 1 to repeat test with new Ammonia Detector.

- 7.13 Determine test results based on Table 1 and report to **MCC-H.**

Table 1. Ammonia Test Pass/Fail Criteria

Reaction Line	Report Status	Assumed Concentration with 2x Factor of Safety
None seen	Passed	10 ppm
$0 < X < 2$	Passed	30 ppm
$2 < X < 5$	Failed	60 ppm
$5 < X < 25$	Failed	180 ppm

4.145 CONTAMINATION TEST

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 3 of 5 pages

8. OXIDIZER CONTAMINATION TEST

8.1 Using RET, retrieve Nitrous Fumes Detector from Contamination Detection Kit.

8.2 Verify Draeger tube color – pale gray

CAUTION

Minimize contact with the fracture regions of the Draeger tube. Minor glove RTV damage is possible, but protective pressure bladders and restraints are unaffected.

8.3 Using equipment hook of RET as a lever, break off both tether points on Nitrous Fumes Detector.

8.4 Insert Nitrous Fumes Detector into ISS Contamination Sampler with orientation that allows number scale to be read.

8.5 ✓ISS Contamination Sampler fully seated on EV Hatch MPEV
✓Nitrous Fumes Detector fully seated in ISS Contamination Sampler

WARNING

Precise sampling times are critical for accurate testing. IV should coordinate start of timer with opening of EV Hatch MPEV.

8.6 EV Hatch MPEV – OPEN

IV

8.7 Start timer (15:00 sampling time).

When timer expired

EV

8.8 EV Hatch MPEV – CLOSED

NOTE

If oxidizer is present, Draeger tube will turn blue gray.

IV

8.9 Compare Crewlock pressure to step 2.

If Crewlock $\Delta P \geq 0.1$ psi (indicates leak in sampling hardware)

MCC-H/IV

8.10 Verify EV Hatch Thermal Cover – Closed

IV(EV)

8.11 To repress Crewlock to 5.0 psi
IV hatch equalization vlv → throttle NORM to OFF

8.12 Go to step 1 to repeat test with new Nitrous Fumes Detector.

4.145 CONTAMINATION TEST

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 4 of 5 pages

- 8.14 Determine test results based on Table 2 and report to **MCC-H**.

Table 2. Nitrous Fumes Test Pass/Fail Criteria

Reaction Line	Report Status	Assumed Concentration with 2x Factor of Safety
$X < 0.5$	Passed	1.5ppm
$0.5 < X < 1$	Failed	3 ppm
$1 < X < 2$	Failed	6 ppm

9. HYDRAZINE CONTAMINATION TEST

- 9.1 Retrieve Hydrazine Detector from Contamination Detection Kit.

NOTE

Hydrazine Detector is double bagged. Inner bag is not captive and should be constrained to prevent FOD.

- 9.2 Tear open Hydrazine Detector packaging.
Stow packaging in small trash bag.
- 9.3 ✓ Initial coupon color – white
- 9.4 Insert Hydrazine Detector into ISS Contamination Sampler.
- 9.5 ✓ ISS Contamination Sampler fully seated on EV Hatch MPEV
✓ Hydrazine Detector fully seated in ISS Contamination Sampler
- 9.6 Helmet Lights – OFF

WARNING

Precise sampling times are critical for accurate testing. IV should coordinate start of timer with opening of EV Hatch MPEV.

- 9.7 EV Hatch MPEV → OPEN
- IV 9.8 Start timer (10:00 sampling time).
- When timer expired
- EV 9.9 EV Hatch MPEV → CLOSED
- IV 9.10 Compare Crewlock pressure to step 2.

4.145 CONTAMINATION TEST

(ISS EVA SYS/7A - ALL/FIN 2/HC/Paper on ISS) Page 5 of 5 pages

MCC-H/IV

IV(EV)

If Crewlock $\Delta P \geq 0.2$ psi (indicates leak in sampling hardware)

9.11 Verify EV Hatch Thermal Cover – Closed

9.12 To repress Crewlock to 5.0 psi

IV Hatch equalization vlv → throttle NORM to OFF

9.13 Go to step 1 to repeat test with new Hydrazine Detector.

NOTE

The hue and intensity of the test coupon color change is proportional to the hydrazine concentration. For shuttle thruster leaks, compare coupon to US Propellant (MMH) color scale. For ISS thruster leaks, compare coupon to Russian Propellant (UDMH) color scale.

9.14 Determine test results based on Table 3 and report to **MCC-H**.

Table 3. Hydrazine Test Pass/Fail Criteria

MMH	Report Status	Assumed Concentration with 2x Factor of Safety
No color change seen	Passed	28 ppb
Unexposed < X < 25 ppb	Passed	50 ppb
25 ppb < X < 50 ppb	Failed	100 ppb
50 ppb < X < 100 ppb	Failed	200 ppb
UDMH		
No color change seen	Passed	54 ppb
Unexposed < X < 50 ppb	Passed	100 ppb
50 ppb < X < 100 ppb	Failed	200 ppb
100 ppb < X < 300 ppb	Failed	600 ppb

10. Go to {4.140 ISS EVA DECONTAMINATION} (SODF: ISS EVA SYS: EMERGENCY).

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(100 Minutes without second repress attempt)

OBJECTIVE:

Given a large Crewlock leak that cannot be supported during Crewlock repress, this procedure depresses the Equipment Lock to vacuum for EV crew ingress and repress.

DEPRESSING CREWLOCK (20 MINUTES)

EV DCM 1. √sw Comm FREQ – LOW

sw COMM mode → PRI

NOTE

Steps 21 to 24 should be performed in parallel as quickly as possible to save EV crew consumables.

If more than one IV crewmember available

IV2 2. Perform steps 21 to 24 immediately, then assist IV1 as available.

IV C-Lk 3. √IV Hatch equalization valve – OFF

EV DCM 4. O2 ACT → EVA

IV PCS 5. Airlock: ECLSS: PCA: VRIV

AL PCA VRIV

'Open'

cmd Arm (√Status – Armed)

cmd Open (√Position – Open)

IV 6. Emergency MPEV → OPEN (EV expect alert tone)
 EV Monitor SUIT P gauge < 5.5.

* If gauge > 5.5, stop depress, √**MCC-H**.

If EV Hatch MPEV is usable per **MCC-H**

EV C-Lk 7. EV Hatch MPEV → OPEN

8. Attach waist tethers to C-Lk (UIA) D-ring.

9. When C-Lk dP/dT ~ 0, (EV expect alert tone)

When EV Hatch ΔP < 26 mmHg (0.5 psi)

10. EV Hatch → open, stow

11. EV Hatch MPEV → CLOSED

12. Inspect EV Hatch seals for damage and debris.
 Remove debris as required.

4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 2 of 6 pages

IV 13. Emergency MPEV → CLOSED

PCS 14. Airlock: ECLSS: PCA: VRIV
AL PCA VRIV
 'Close'

cmd Close (√Position – Closed)

15. √**MCC-H** for EMU consumables

EV If second repress attempt desired and > 90 minutes of EMU consumables

16. √Thermal cover – closed

17. EV Hatch → close and lock

18. Go to CREWLOCK REPRESS {CREWLOCK DEPRESS/REPRESS CUE CARD} (SODF: ISS EVA SYS: EVA PREP/POST) steps 3 to 11.

EV If < 80 minutes of EMU Metox (LiOH) remain

19. Helmet Purge vlv → open

PREPARING EQUIPMENT LOCK FOR VACUUM (20 MINUTES)

MCC-H/IV	IV	EV
PCS: 20. Perform {4.152 EQUIPMENT LOCK CONFIG FOR VACUUM}, steps 1 to 12. (SODF: ISS EVA SYS: EMERGENCY), then:	Metx. 21. √sw POWER – OFF Regen. √ON LED – Off BCA 22. √sw MAIN POWER (four) – OFF √LEDs (four) – Off EACP 23. √sw PWR – OFF 24. Remove from E-lk: All bags All laptops (PCS, SSC) spare EMU(s) All PHAs All PBAs PFE EMU Equip Bag EMU Serv Kit All floor bin-stowed items 25. Egress E-Lk 26. Close Node1 Stbd Hatch per decal. 27. √Node 1 Stbd Hatch MPEV – CLOSED and uncapped	C-Lk 28. Begin removing every other Velcro strap from SCU. C-Lk IVA Bag: 29. Retrieve EVA Ratchet and 7/16" X 6" wobble socket 30. Cold soak as time allows. Temp control vlv → increase toward Max C (slightly colder than comfortable)

4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

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EQUIPMENT LOCK DEPRESS (15 MINUTES)

MCC-H, IV 31. Give a go for Equipment Lock depress.

EV C-Lk 32. ✓EV Hatch – Open and stowed

33. IV Hatch equalization valve → EMER

WARNING

Hatch latch mechanism is a pinch hazard.
Verify EV crew is clear of it.

MCC-H/IV
PCS

34. Airlock: ECLSS:
'Equipment Lock'
Monitor 'Cab Press'

When 'Cab Press' ~ 0 mmHg (10 to 15 minutes)

EV C-Lk 35. Open IV Hatch per decal.

36. IV Hatch equalization valve → OFF

37. EV Hatch Thermal Cover → Close

38. Partially close EV Hatch. Leave small gap for water sublimation.

39. Waist Tethers ←|→ C-Lk D-ring; attach to EMUs

CONFIGURING FOR SCU REMOVAL (5 MINUTES)

40. Transfer the following to Equipment Lock and secure:

IV Bag
Staging Bag
Crewlock EVA Bags (four)
All ORUs

If Helmet Purge vlv – open (per step 19, to conserve Metox/LiOH)

41. Helmet Purge vlv → close and lock

DCM 42. ✓STATUS: O2 P > 850

WARNING

EV crew will be without SCU O2 supply for approximately 40 minutes. If Metox (LiOH) canister expended, open/close helmet purge valve as required to maintain safe ppCO2 levels. The SOP may be required to complete the procedure.

MCC-H/IV
PCS

43. CLOSING AIRLOCK O2 HI PRESSURE SUPPLY VALVE

Airlock: ECLSS: O2 Hi Pressure Supply Vlv
AL O2 Hi Pressure Supply Valve

cmd Close (Verify Actual Position – Closed)

4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

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- EV DCM 44. sw POWER → BATT, (expect warning tone)
- UIA 45. sw PWR EV-1,2 (two) → OFF
- √PWR EV-1,2 LEDs (four) – Off
- DCM 46. SCU ←|→ DCM
Install DCM cover.
- C-lk 47. Stow SCU in pouch.
- DCM 48. Temp control vlv → Max H
49. sw WATER → ON
- √DCM display – blank, BITE – off
50. Temp control vlv → 3 to Max C (slightly colder than comfortable)

MCC-H/IV
PCS

51. DISABLING THE POWER SUPPLY ASSEMBLY

Airlock: EPS: RPCM AL2A3B B

sel RPC 18

RPCM AL2A3B B RPC 18

cmd Open Cmd – Enable (√Open Cmd – Ena)

cmd RPC Position – Op (√RPC Position – Op)

MCC-H

52. Give EV crew a go for SCU Removal.

REMOVING SCU FROM UIA (20 MINUTES)

MCC-H/IV	EV
53. Perform {4.152 EQUIPMENT LOCK CONFIG FOR VACUUM}, step 13 (SODF: ISS EVA SYS: EMERGENCY), then:	<div>CAUTION ОРЛАН caps on UIA are not tethered. Be prepared to catch them during removal.</div> <p>54. Perform {SCU REMOVAL FROM UIA (AT VACUUM)}, pages 32 and 33 (SODF: ISS EVA SYS: CUFF CHECKLIST), then:</p>

EQUIPMENT LOCK INGRESS (5 MINUTES)

- DCM 55. Begin maximum cold soak.
Temp control vlv → Max C

4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

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56. Transfer SCUs to E-Lk and secure

57. ✓ All items removed from C-Lk

NOTE

EV crew will be without cooling after the next step.

58. sw WATER → OFF

59. EV Hatch → fully close, lock

✓ EV Hatch MPEV – CLOSED

60. Ingress E-Lk.

✓ IV Hatch clear of debris.

EV

61. Close IV Hatch per decal, lock.

✓ IV Hatch equalization valve – OFF

EQUIPMENT LOCK REPRESS (15 MINUTES)

NOTE

EV crew disregard **SET O2 PRESS** message during repress.

MCC-H

62. Give a go for Equipment Lock Repress

EV/IV

63. Node 1 Stbd Hatch MPEV → throttle CLOSED to OPEN (as required), EV expect alert tone

EV DCM

64. E-Lk at 4.0, EV expect alert tone.

WARNING

1. If Cuff 1 symptoms resolving upon repress, report as Cuff 2.
2. If any DCS, O2 ACT → PRESS instead of IV in the next step.

DCM

When AIRLK P > 5.0 psia

65. O2 ACT → IV

WARNING

Verify EV crew is clear of hatch latch mechanism.

When E-Lk dP/dT ~ 0 (EV expect alert tone)

66. Open Node 1 Stbd Hatch per decal.

4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA

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67. √Node 1 Stbd Hatch MPEV – CLOSED

IV

68. Install IV Hatch equalization valve cap.

MCC-H	IV and EV
69. Go to {4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE} (SODF: ISS EVA SYS: EMERGENCY).	70. Perform {4.115 EXPEDITED SUIT DOFFING}, all (SODF: ISS EVA SYS: EMERGENCY), then: √MCC-H for deltas

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 1 of 8 pages

I

(20 minutes)

OBJECTIVE:

Command ISS hardware to a configuration safe for Equipment Lock Depress and Repress.

NOTE

This procedure should normally be performed by **MCC-H**.

MCC-H/IV

PCS

1. Rapid Depress: ISS IMV Isolation

ISS IMV Isolation

'Airlock IMV Isolation'

cmd Arm (√Arm Status – Armed)

cmd Isolate

√Status – Isolated

2. Node 1: ECLSS: IMV Stbd Aft Vlv

Node 1 IMV Stbd Aft Valve

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√State – Inhibited)

sel RPCM N14B C RPC 13

cmd RPC Position – Open (Verify – Op)

3. Node 1: ECLSS: IMV Stbd Fwd Vlv

Node 1 IMV Stbd Fwd Valve

'Inhibit'

cmd Arm (√Arm Status – Armed)

cmd Inhibit (√State – Inhibited)

sel RPCM N14B A RPC 16

cmd RPC Position – Open (Verify – Op)

4. US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'CDRA'

If CDRA State – Operate

'Stop'

NOTE

Per SPN 1903 (5A-AC), the Disarm command should be sent after the Stop command because it does not automatically disarm itself.

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 2 of 8 pages

cmd Arm (√Status – Armed)
cmd Stop
cmd Disarm (√Status – Disarmed)

√CDRA Status – Stop Complete

PCS

5. US Lab: TCS

LAB:IATCS Overview

'Status'

If Mode – Sngl LT or Sngl MT
Go to step 6.

US Lab: TCS: IATCS Details: LAB Act TCS RPC Commands

LAB Act TCS RPC Commands

Verify positions of all RPCs (17) – CI

US Lab: TCS: IATCS Details

IATCS Details

Verify LTL PPA RT Status – Ena

Verify MTL PPA RT Status – Ena

US Lab: TCS: Software

Software Commands

'IATCS'

'Mode'

cmd Sngl LT – Arm (√Arm Status – Sngl LT Armed)

cmd Sngl LT – Sngl LT

Expect Caution message '**Lab LTL SFCA Uncontrolled DP - LAB**'

Expect Caution message '**Lab MTL SFCA Uncontrolled DP - LAB**'

NOTE

Multiple LAB1XX Rack Temp and Flow
Cautions can be expected.

Wait up to 3 minutes.

US Lab: TCS

Lab:IATCS Overview

'Status'

'IATCS'

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 3 of 8 pages

Verify Status – Oper
Verify Mode – Sngl LT

NOTE

Lowering the LTL SFCA Mod Vlv dP prior to commanding LCA Vlv 2 to Dual is necessary due to the expected large pressure transient. At the nominal setpoint, the pressure spike may trigger the SFCA Overpress FDIR, resulting in auto reduction of LTL Pump Speed.

US Lab: TCS: LTL SFCA

LTL SFCA Commands

'LTL SFCA'

'Mod Vlv dP Setpt'

input New Setpoint – 20.7 kPa

cmd Set – Set ($\sqrt{\text{Mod Vlv dP Setpt: 20.7 kPa}}$)

US Lab: TCS

Lab: IATCS Overview

'SFCA'

$\sqrt{\text{LTL Mod Vlv dP: } 20.7 \pm 7 \text{ kPa}}$

Configuring LCA Valve 2 to Dual Position

US Lab: TCS: LCA Icon

LCA Commands

'LCA'

$\sqrt{\text{Vlv1 Posn – Sngl}}$

If Vlv2 Posn – Sngl then

cmd Vlv2 Posn – Dual **Execute**

$\sqrt{\text{Vlv2 Posn – Dual}}$

US Lab: TCS: LTL SFCA

LTL SFCA Commands

'LTL SFCA'

'Mod Vlv dP Setpt'

input New Setpoint – 75.8 kPa

cmd Set – Set ($\sqrt{\text{Mod Vlv dP Setpt: 75.8 kPa}}$)

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

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NOTE

LT Setpoint is raised to prevent localized freezing of water on the AL CCAA HX surfaces. While the LT setpoint is elevated, LAB CCAs are not providing any latent cooling.

6. RAISING LT SETPOINT

PCS

P6: TCS: Loop A(B) Details: PPL Ver ID

PPL_Ver_ID

'P6 PVCA EETCS'

'Setpt PPL Ver ID'

√Prime: 106

√Bkup: 106

If Ver ID ≠ 106, √**MCC-H**

P6: TCS: Loop A(B) Line Heater Icon

Loop A(B) Line Heater Commands

'EETCS LoopA(B) PFCS'

√Line Htr Cntl – Ena

If Line Htr Cntl – Inh

√Inhibited Line Htr ≠ Both

Repeat step for both EETCS Loop A and Loop B.

LAB: TCS: LTLTWMV Icon

LTL TWMV Commands

'LTL TWMV'

'Temp Setpt'

input – 2 1

cmd Set Execute

√Temp Setpt – 21.0° C

If after several minutes, LTL TWMV Out Temp < 21.0° C

Raise the MTL TWMV Temp Setpoint to increase temperature of water entering LT IFHX.

LAB: TCS: MTL TWMV Icon

MTL TWMV Commands

'MTL TWMV'

'Temp Setpt'

input – 1 5

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 5 of 8 pages

cmd Set Execute

√Temp Setpt – 15.0° C

cmd CLC – Ena (Verify – Ena)

Raise MTL TWMV Temp Setpoint in 2-degree increments as required until LTL TWMV Out Temp $-21.0 \pm 0.6^{\circ} \text{C}$.

7. Fire Summ: Airlock

AL Fire Display

'Fire Isolation'

'Cabin Air Assembly'

cmd Stop (√State – EIB Off)

sel AL CCAA

AL CCAA: CCAA Commands

AL CCAA Commands

sel RPCM AL2A3B B RPC [X] where [X] = **3** **5** **6** **17**

cmd RPC Position – Open (√ – Op)

Repeat

8. Fire Summ: Airlock

AL Fire Display

'Airlock Smoke Detectors'

sel Cabin

AL Cabin Smoke Detector

'Monitoring'

cmd Inhibit (√Status – Inhibited)

sel RPCM AL2A3B A RPC 08

RPCM AL2A3B A RPC 08

cmd RPC Position – Open (Verify – Op)

AL Fire Display

'Airlock Smoke Detectors'

sel Duct

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 6 of 8 pages

AL Duct Smoke Detector

'Monitoring'

cmd Inhibit (√Status – Inhibited)

sel RPCM AL2A3B B RPC 07

RPCM AL2A3B B RPC 07

cmd RPC Position – Open (Verify – Op)

MCC-H

9. Configuring MCA for Sampling LAB/NODE

AL Fire Display

'LAB MCA'

√State – Operate

If State not Operate
Go to step 10.

sel LAB MCA

LAB MCA

sel Nominal Cmds

LAB MCA Nominal Commands

NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

'Standby'

cmd Immediate

√State – Standby

'Auto Sequencing'

cmd LAB/Node1

√State – Operate

LAB MCA

sel Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 7 of 8 pages

10. C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 3 6 8 (Cabin Pressure Low-E/L)

cmd Arm

cmd Execute

input Event Code – 6 5 7 6 (Rapid Depress-A/L)

cmd Arm

cmd Execute

input Event Code – 6 3 5 6 (Cabin Pressure Above Normal-E/L)

cmd Arm

cmd Execute

input Event Code – 5 9 1 0 (Cabin Pressure Below Normal-E/L)

cmd Arm

cmd Execute

11. Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

'Inhibit'

cmd Inhibit – Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Inhibit ($\sqrt{\text{Status}}$ – Inhibited)

'CC MDM Rapid Depress Response'

'Inhibit'

cmd Arm ($\sqrt{\text{Status}}$ – Armed)

cmd Inhibit ($\sqrt{\text{Status}}$ – Inhibited)

12. DEACTIVATING AIRLOCK ATUS, CVIU, AND UOP

Airlock: EPS: RPCM AL2A3B A

sel RPC [X] where [X] = 1 3 14 17

cmd RPC Position – Open ($\sqrt{\text{Op}}$ – Op)

Repeat

4.152 EQUIPMENT LOCK CONFIG FOR VACUUM

(ISS EVA SYS/7A - ALL/FIN 4/PAPER ON ISS) Page 8 of 8 pages

Airlock: EPS: RPCM AL2A3B B: RPC 01

RPCM AL2A3B B RPC 01

'RPC Position'

cmd RPC Position – Open (√ – Op)

Prior to Equipment Lock Repress

13. INHIBITING ISS RAPID DEPRESS RESPONSE AND C&W

MCC-H/V
PCS

13.1 Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'INT MDM Rapid Depress Response'

'Inhibit'

cmd Inhibit Arm (√Status– Armed)

cmd Inhibit (√Status – Inhibited)

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Inhibit

Inhibit an Event

input Event Code – 6 5 7 5 (Rapid Depress – LAB)

cmd Arm

cmd Execute

13.2 Inhibiting CCS Low Pressure Safing Response

Rapid Depress: Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'CC MDM Low Cabin P Response'

'Inhibit'

cmd Arm (√Status – Armed)

cmd Inhibit (√Status – Inhibited)

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 1 of 6 pages

OBJECTIVE:

Reconfigure ISS systems back to normal following execution of procedure

{4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA} (SODF: ISS EVA SYS: EMERGENCY). This procedure is nominally performed by **MCC-H**.

MCC-H/IV
PCS

1. RECONFIGURING IATCS

1.1 US Lab: TCS: LTL TWMV Icon

LTL TWMV Commands

'Commands'

'LTL TWMV'

cmd CLC – Ena **Execute** ($\sqrt{\text{CLC} - \text{Ena}}$)

NOTE

If LTL or MTL TWMV setpoints were previously changed in response to Crewlock leak, then setpoints must be reset to the original values.

1.2 For LTL TWMV and MTL TWMV as necessary, perform {2.201 LAB IATCS SETPOINT CHANGE}, all (SODF: TCS: NOMINAL: IATCS), then:

PCS

2. ENABLING RAPID DEPRESS RESPONSE

Rapid Depress

ISS Depress

'LAB'

Wait until $|dP/dT| < 0.04$ mmHg/min.

2.1 Enabling Rapid Depress Response

sel Rapid Depress Response Software Control

US Rapid Depress Response Software Control

'Airlock Depress Response – INT MDM'

'Enable'

cmd Enable ($\sqrt{\text{Status} - \text{Enabled}}$)

'INT MDM Rapid Depress Response'

'Enable'

cmd Enable ($\sqrt{\text{Status} - \text{Enabled}}$)

'CC MDM Rapid Depress Response'

'Enable'

cmd Enable ($\sqrt{\text{Status} - \text{Enabled}}$)

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 2 of 6 pages

2.2 Enabling CCS Low Pressure Safing Response

'CC MDM Low Cabin P Response'

'Enable'

cmd Enable (√Status – Enabled)

3. ENABLING ALARMS

C&W Summ

Caution & Warning Summary

'Event Code Tools'

sel Enable

Enable an Event

input Event Code: [X] where [X] =

6368 Cabin Pressure Low-E/L

5910 Cabin Pressure Below Normal-E/L

6356 Cabin Pressure Above Normal-E/L

6576 RAPID DEPRESS-A/L

6575 RAPID DEPRESS-LAB

cmd Execute

Repeat

4. ACTIVATING AIRLOCK ATUS, CVIU, AND UOP

Airlock: EPS: RPCM AL2A3B A

RPCM AL2A3B A

sel RPC [X] where [X] = 1 3 14 17

RPCM AL2A3B A RPC [X]

cmd RPC Position – Close (Verify – CI)

Repeat

Perform {2.213 AUDIO SUBSYSTEM CONFIGURATION FOR UHF OPS}, steps 9 to 12 (SODF: C&T: NOMINAL: AUDIO), then:

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 3 of 6 pages

5. RELEASING IMV ISOLATION

Rapid Depress: Isolation Status

☐ ISS IMV Isolation

'Airlock IMV Isolation'

cmd Release (√Airlock IMV Isolation Status – Released)

6. ACTIVATING AIRLOCK SMOKE DETECTORS

6.1 Fire Summ: Airlock

☐ AL Fire Display

'Airlock Smoke Detectors'

sel Cabin

sel RPCM AL2A3B A RPC 08

☐ RPCM AL2A3B A RPC 08

cmd RPC Position – Close (Verify – CI)

☐ AL Cabin Smoke Detector

Verify Obscuration, % Contamination < 25.

Verify Scatter, % Obscuration per Meter < 1.

'Monitoring'

cmd Enable (√Status – Enabled)

Wait 5 seconds.

'Active BIT'

√Failure – blank

'Passive BIT'

√Lens Status – Clean

√Failure – blank

6.2 Fire Summ: Airlock

☐ AL Fire Display

'Airlock Smoke Detectors'

sel Duct

sel RPCM AL2A3B B RPC 07

☐ RPCM AL2A3B B RPC 07

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 4 of 6 pages

cmd RPC Position – Close (Verify – CI)

AL Duct Smoke Detector

Verify Obscuration, % Contamination < 25.

Verify Scatter, % Obscuration per Meter < 1.

‘Monitoring’

cmd Enable (√Status – Enabled)

Wait 5 seconds.

‘Active BIT’

√Failure – blank

‘Passive BIT’

√Lens Status – Clean

√Failure – blank

7. REESTABLISHING INTERMODULE VENTILATION

7.1 Node 1: ECLSS: IMV Stbd Aft Valve

Node 1 IMV Stbd Aft Vlv

sel RPCM N14B C RPC 13

cmd RPC Postion – Close (Verify – CI)

‘Enable’

cmd Arm (√Arm State – Armed)

cmd Enable (√State – Enabled)

‘Open’

cmd Arm (√Arm Status – Armed)

cmd Open

√Position – In Transit

Wait 25 seconds.

√Position – Open

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

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7.2 Node 1: ECLSS: IMV Stbd Aft Fan

Node 1 IMV Stbd Aft Fan

'On'

cmd On

√State – In Transit

Wait 15 seconds.

√State – On

√Speed: 7745 to 9278 rpm

7.3 Node 1: ECLSS: IMV Stbd Fwd Valve

Node 1 IMV Stbd Fwd Vlv

sel RPCM N14B A RPC 16

cmd RPC Position – Close (Verify – CI)

Node 1 IMV Stbd Fwd Vlv

'Enable'

cmd Arm (√Arm Status – Armed)

cmd Enable (√State – Enabled)

8. [ACTIVATING AIRLOCK CCAA](#)

To activate Airlock CCAA, perform {[1.509 AIRLOCK CCAA ACTIVATION](#)}, steps 3 to 9 (SODF: ECLSS: ACTIVATION AND CHECKOUT: THC), then:

9. [RECONFIGURING MCA AUTOSEQUENCE LIST](#)

NOTE

The nominal autosequence list will include Node, Airlock, and Lab modules when MPLM is not available.

4.155 RECONFIGURATION FOLLOWING CREWLOCK LARGE LEAK RESPONSE

(ISS EVA SYS/8A - ALL/FIN 3)

Page 6 of 6 pages

If desired autosequence list is LAB/Node1/Airlock, LAB/Node1, or LAB/Node1/Airlock/MPLM

NOTE

Per SPN 3572 (5A - x2 INTR3), the MCA can get out of sync with the INT SYS after an autosequence command. To prevent this, a Standby Immediate command should be issued first.

US Lab: ECLSS: AR Rack

LAB AR Rack Overview

'Standby Immediate'

cmd Standby Immediate

√State – Standby

'MCA'

'Auto Sequence'

cmd LAB/Node1/Airlock (LAB/Node1)
(LAB/Node1/Airlock/MPLM)

√State – Operate

US Lab: ECLSS: AR Rack: MCA: Additional TIm

LAB MCA Additional TIm

√Invalid Sequence – blank

If another autosequence list is desired, perform {2.301 MCA AUTO SEQUENCE LIST CHANGE}, all (SODF: ECLSS: NOMINAL: ARS), then:

10. ACTIVATING CDRA

If required, to activate CDRA, go to {1.301 ATMOSPHERE REVITALIZATION RACK ACTIVATION}, step 10 (SODF: ECLSS: ACTIVATION AND CHECKOUT: ARS).

REFERENCE

	<u>GND</u>	<u>ISS</u>
5.105 HARDCOPY MATRIX.....	619	MPV
5.110 APPROVED NON-EMU HARDWARE.....	625	MPV

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5.105 HARDCOPY MATRIX

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NOTE

This matrix shows what the ISS community believes are the procedures that must be available hardcopy to the ISS crew for safe and/or efficient operations. This list documents which procedures are available to the crew in hardcopy format. Additions or deletions to this list are controlled by the SODFCB and managed by an SODF Workflow CR.

Procedure Title	Rationale	Pages
1.205 SHUTTLE LEH CONFIGURATION FOR EVA PREBREATHE ON ISS	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency.	2
1.210 EVA PREP USING SHUTTLE O2	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency. The wireless LAN cannot be relied upon for procedure availability at 10.2 psia. Additionally, the SSC cannot be operated with an EMU glove.	13
1.215 EVA PREP USING ISS O2	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency. The wireless LAN cannot be relied upon for procedure availability at 10.2 psia. Additionally, the SSC cannot be operated with an EMU glove.	13
1.220 EMU PURGE	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency. The wireless LAN cannot be relied upon for procedure availability at 10.2 psia. Additionally, the SSC cannot be operated with an EMU glove.	2
1.225 EMU PREBREATHE	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency. The wireless LAN cannot be relied upon for procedure availability at 10.2 psia. Additionally, the SSC cannot be operated with an EMU glove.	4
CREWLOCK DEPRESS/REPRESS CUE CARD	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency.	2
1.235 EMU STATUS	The IV crewmember is required to record EMU status, so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency.	6

5.105 HARDCOPY MATRIX

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Procedure Title	Rationale	Pages
1.240 POST EVA	The SSC cannot be operated with an EMU glove, so a hardcopy is necessary to ensure an on-time EVA. Otherwise, there will be a significant impact to crew efficiency.	6
EVA PREBREATHE CUE CARD	There are time constraints involved with EVA Prep so a hardcopy is necessary to ensure an on-time EVA in case MPV is not readily accessible. Otherwise, there will be a significant impact to crew efficiency. Additionally, the SSC cannot be operated with an EMU glove.	2
1.305 EQUIPMENT LOCK PREP	This procedure is typically required immediately post docking which is a time-critical period for EVA preparations. There will be a significant impact to crew efficiency if MPV is not readily available during these activities.	6
1.307 REBA INSTALLATION/REMOVAL	This procedure is typically required immediately post docking which is a time-critical period for EVA preparations. There will be a significant impact to crew efficiency if MPV is not readily available during these activities.	2
1.335 SAFER ON-BOARD TRAINING	A hardcopy of this procedure is needed because two SSCs are required to run SAFER and DOUG software.	4
1.402 EMU/AIRLOCK INTERFACE CHECK	The time constraints involved with the EMU/Airlock Interface Check require that a hardcopy be available to ensure an on-time EVA if MPV is not accessible.	5
1.403 REBA POWERED HARDWARE CHECKOUT	The time constraints involved with REBA Powered Hardware C/O require that a hardcopy be available to ensure an on-time EVA if MPV is not readily accessible.	2
1.406 EMU CHECKOUT RESULTS	Many DCM values need to be recorded throughout checkout on to a piece of paper.	1
1.411 EMU MID TERM CHECKOUT RESULTS TABLE	Many DCM values need to be recorded throughout checkout on to a piece of paper.	1
1.416 EMU CHCKOUT ON BATTERY POWER RESULTS	Many DCM values need to be recorded throughout checkout on to a piece of paper.	1
1.505 EMU WATER RECHARGE	The time constraints involved with an EVA require a hardcopy of this procedure to be readily available to ensure an on-time EVA if MPV is not accessible.	7
1.510 METOX REGENERATION	The time constraints involved with an EVA require a hardcopy of this procedure to be readily available to ensure an on-time EVA if MPV is not accessible.	4

5.105 HARDCOPY MATRIX

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Procedure Title	Rationale	Pages
1.605 BSA BATTERY RECHARGE	The time constraints involved with an EVA require a hardcopy of this procedure to be readily available to ensure an on-time EVA if MPV is not accessible.	4
1.610 EMU BATTERY MAINTENANCE USING SSC IN DOS MODE	A hardcopy is necessary because the SSC is required to run the Battery Discharge software.	5
1.615 EMU BATTERY DISCHARGE USING SSC IN DOS MODE	A hardcopy is necessary because the SSC is required to run the Battery Discharge software.	5
2.105 DISPLAY LOSS DURING POWER TRANSFER	Crew safety will be at risk if MPV is not readily available.	1
2.110 FAILED LEAK CHECK (5 PSIA)	Crew safety will be at risk if MPV is not readily available.	1
2.115 FAILED LEAK CHECK (10.2/14.7PSIA)	Crew safety will be at risk if MPV is not readily available.	2
2.120 METOX/LIOH REPLACEMENT (MANNED)	Crew safety will be at risk if MPV is not readily available.	2
2.125 BATTERY REPLACEMENT (MANNED)	Crew safety will be at risk if MPV is not readily available.	3
2.130 SCU SWAP (MANNED)	Crew safety will be at risk if MPV is not readily available.	1
2.140 EMU COLD RESTART (MANNED)	Crew safety will be at risk if MPV is not readily available.	1
2.205 CREWLOCK SMALL LEAK RESPONSE AT 5 PSIA	Crew safety will be at risk if MPV is not readily available.	6
2.216 CONTINGENCY CREWLOCK REPRESS	Crew safety will be at risk if MPV is not readily available.	2
2.217 CONTINGENCY AIRLOCK DEPRESS TO 10.2 PSIA	Crew safety will be at risk if MPV is not readily available.	12
2.220 CONTINGENCY CREWLOCK DEPRESS USING VAJ	Crew safety will be at risk if MPV is not readily available.	2
2.230 METOX REGENERATION	Crew safety will be at risk if MPV is not readily available.	1

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(ISS EVA SYS/LF1 - ALL/FIN)

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Procedure Title	Rationale	Pages
CYCLE ABORT		
NORMAL EVA STATUS	Cuff C/L	1
DCM CONFIG	Cuff C/L	1
EMU MALFUNCTION INDEX	Cuff C/L	1
DECOMPRESSION SICKNESS	Cuff C/L	2
ABORT EVA	Cuff C/L	1
TERMINATE EVA	Cuff C/L	1
SOP O2 ON	Cuff C/L	1
BATT AMPS HIGH	Cuff C/L	1
BATT VDC LOW	Cuff C/L	1
SUIT P LOW	Cuff C/L	1
SUIT P HIGH	Cuff C/L	1
SOP P LOW	Cuff C/L	1
O2 USE HIGH	Cuff C/L	1
SUBLM PRESS	Cuff C/L	1
H2O GP LOW	Cuff C/L	1
RESRV H2O ON	Cuff C/L	1
NO VENT FLOW	Cuff C/L	1
CO2	Cuff C/L	1
COMMUNICATION FAILURE	Cuff C/L	1
AIRFLOW CONTAMINATION	Cuff C/L	1
LOSS OF COOLING	Cuff C/L	1
MISCELLANEOUS MESSAGES	Cuff C/L	2
IV HATCH LATCH DISCONNECT	Cuff C/L	2
EV HATCH LATCH DISCONNECT	Cuff C/L	1
EV HATCH HINGE DISCONNECT	Cuff C/L	1
SSRMS FRGF RELEASE	Cuff C/L	1
SSRMS PDGF RELEASE	Cuff C/L	1
SSRMS LEE LATCH	Cuff C/L	1

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Procedure Title	Rationale	Pages
CONTINGENCY		
SCU REMOVAL FROM UIA (AT VACUUM)	Cuff C/L	2
CREWLOCK EGRESS	Cuff C/L	1
CREWLOCK INGRESS	Cuff C/L	1
4.105 EMERGENCY CREWLOCK REPRESS	Crew safety will be at risk if MPV is not readily available.	1
4.110 POST EMERGENCY CREWLOCK REPRESS	Crew safety will be at risk if MPV is not readily available.	1
4.115 EXPEDITED SUIT DOFFING	Crew safety will be at risk if MPV is not readily available.	2
4.120 DCS TREATMENT	Crew safety will be at risk if MPV is not readily available.	4
4.125 BENDS TREATMENT ADAPTER INSTALL (POST SUIT DOFFING)	Crew safety will be at risk if MPV is not readily available.	7
4.130 BENDS TREATMENT ADAPTER INSTALL (IN SUIT)	Crew safety will be at risk if MPV is not readily available.	4
4.135 SAFER RESCUE	Crew safety will be at risk if MPV is not readily available.	1
4.140 ISS EVA DECONTAMINATION	Crew safety will be at risk if MPV is not readily available.	9
4.145 CONTAMINATION TEST	Crew safety will be at risk if MPV is not readily available.	5
4.150 CREWLOCK LARGE LEAK RESPONSE AT 5 PSIA	Crew safety will be at risk if MPV is not readily available.	6
4.152 EQUIPMENT LOCK CONFIG FOR VACUUM	Crew safety will be at risk if MPV is not readily available.	8

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5.110 APPROVED NON-EMU HARDWARE

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OBJECTIVE:

Reference of approved non-EMU hardware that can be worn in the suit.

Item	Part Number	Item	Part Number	Item	Part Number
Passive Dosimeter	SED11100212	Band-Aids	8137004444	Genoptic Ophthalmic Ointment	17478-284-35
Panty Shield	S019BY2033	Band-Aids	8137004431	Kerlix Dressing	6715
Sock	528-40802	Band-Aids	8137004430	Kerlix Dressing	K6715
Sock	ST11C802	Band-Aids	09681	Kling Dressing	6923
Sock liner	ST17C3309	Band-Aids	555-3036	Lidocaine Jelly	186033036
Ponytail Holder	528-41572	Band-aid Sheer Dot	4930	Lotrimin Cream	0085-0963-17
Croakie - Modified	528-21224	Band-aid Strips	NON256602	Moleskin	528-4304-1
GRD Croakie	CP-3-XX-XX1-XX	Band-Aids Sheer Spot	555-8243	Neosporin Plus Cream	0501-3712-05
Croakie	528-41822	Benzoin Swabs	26-06-09	Polysporin Ointment	81079887
Eye Glasses	CP-3-XX-XX-XX	Benzoin Swabs	26-06-19	Polytrim	23782410
OBS Cable	SED42100961	Bioclusive	2461	Povidone Iodine Swabs	26-02-86
OBS Signal Cond.	16843	Blistex	1015798221	Pred Forte	1198018001
OBS Sternal Harness	SH42100149	Blistex	10157-9920-2	Proparacaine	998001615
OBS Sternal Harness	SH46115992	Ciloxan 0.3%	0065-0654-35	Providone-Iodine Swabs	4335260286
OBS Sternal Harness	13726	Ciloxan Ointment	65065625	Silvadene Cream	88105020
MBED	528-21260	Ciprofloxacin Ointment	0065-0654-35	Silvadene Cream	61570-131-20
Russian Dosimeter	IBMP-CPD-001	Clotrimazole Cream	5167212751	Steri-Strip	R1547
3" Ace Bandage	23593-130	Cortisporin Ophthalmic	615003675	Steri-Strip	R1546
4" Ace Bandage	54251A7	Coverlets	01306	Tears Naturale	65041830
6" Ace Bandage	54252A7	Cyclogyl	65039715	Tefla Pads	890-2865
4" X 4" Gauze	555-6284	Dermabond	DB12	Tegaderm	1624W
4" X 4" Vaseline Gauze	8884-414600	Dermabond	301128243	Tegaderm Dressing	1626
Adaptec Dressing	K6112	Dermicel Tape	5143	Telfa Pads	890-2865
Adaptec Non-adhering Dressing	2012	Dermicel Tape	5144	Tobrex Solution	65064305
Afrin Nasal Spray	8575608	Elastoplast Tape	23631-040X	Topicort	99207-011-15
Auralgan	46100010	Eye pads	J8773	Triamcinolone Acetonide Dental Paste	5167212675
Bacitracin	2438506003	Famciclovir	0007-4117-13	Triamcinolone Cream	4580206435
Bactroban Ointment	0029-1527-22	Gauze Pads	2337	VIROPTIC	61570-037-75
Bactroban Ointment	29152544	Gauze Pads	555-6284	Zovirax Ointment	73099394

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INTERNATIONAL SPACE STATION

ISS EVA SYSTEMS CHECKLIST

